

The
Association of Special Libraries
and Information Bureaux

Report of Proceedings

of the

FIFTH CONFERENCE

held at

New College, Oxford

SEPTEMBER 14th—17th, 1928

THE OBJECTS OF THE ASSOCIATION ARE : To examine, foster, and co-ordinate the activities of special libraries, information bureaux, and similar services ; to act as a clearing-house for these services ; to develop the usefulness and efficiency of special libraries and information bureaux under whatever titles they may function ; and generally to promote, whether by conferences, meetings, or other means, the wider dissemination and the systematic use of published information.

The Association aims at assisting members who desire information of any kind to get into touch with the appropriate library or other body specializing on the subject ; it does not itself attempt to build up any centralized organization to provide the detailed information direct.

PUBLISHED BY THE ASSOCIATION OF SPECIAL LIBRARIES
AND INFORMATION BUREAUX
26, BEDFORD SQUARE, LONDON, W.C.1

1928

PRICE - 5/-

The Association of Special Libraries and Information Bureaux.

26, BEDFORD SQUARE, LONDON, W.C.1.

COUNCIL :

Chairman : J. G. PEARCE, M.Sc.,
M.I.E.E.,
British Cast Iron Research Association.

Vice-Chairman : P. K. TURNER,
M.I.E.E., M.I.R.E.,
Graham Amplion Ltd.

F. W. CLIFFORD, F.L.A.,
Chemical Society.

PERCY COHEN,
Conservative and Unionist Central
Office.

A. P. M. FLEMING, C.B.E., M.Sc.,
M.I.E.E.,
Metropolitan-Vickers Electrical Co.,
Ltd.

H. VINCENT GARRETT,
Rowntree and Co., Ltd.

SIR RICHARD GREGORY, D. Sc.,
F.Inst.P., F.R.A.S.,
British Science Guild.

B. M. HEADICAR, F.L.A.,
London School of Economics and
Political Science.

L. HONEYBURN,
Imperial Chemical Industries, Ltd.

E. WYNDHAM HULME, B.A.,
(Late Librarian, Patent Office).

R. S. HUTTON, D.Sc.,
(Director, British Non - Ferrous
Metals Research Association).

Honorary Treasurer : BRIG.-GENERAL
MAGNUS MOWAT, C.B.E.,
M.Inst.C.E., M.I.Mech.E.,
Institution of Mechanical Engineers.

Honorary Secretary : MISS A. L.
LAWRENCE, M.B.E., M.A., LL.B.,
British Medical Association.

COLONEL E. L. JOHNSON,
Cleveland Scientific and Technical
Institution.

COLONEL SIR HENRY G. LYONS, D.Sc.,
F.R.S.,
The Science Museum.

LIEUT.-COLONEL J. M. MITCHELL,
O.B.E., M.C., M.A.,
Carnegie United Kingdom Trust.

LIEUT.-COLONEL L. NEWCOMBE, T.D.,
F.L.A.,
Central Library for Students.

A. F. RIDLEY, F.L.A.,
British Non - Ferrous Metals
Research Association.

F. W. SMITH,
Association of Supervising Elec-
trical Engineers.

MAJOR L. F. URWICK, O.B.E., M.C.
M.A.,
Management Research Groups.

G. B. WILLEY, A.R.S.M., F.I.C.,
Hadfields, Ltd. (Research Dept.).

J. C. WITHERS, Ph.D.,
British Cotton Industry Research
Association.

General Secretary : S. S. BULLOCK.

LIST OF VISITORS TO THE FIFTH CONFERENCE.

- 1 MRS. R. J. ADAM. National Society for the Prevention of Cruelty to Children.
- 2*P. S. ALLEN, M.A., D.Litt., F.B.A. Corpus Christi College, Oxford.
- 3 MISS M. S. ASLIN. Rothamsted Experimental Station.
- 4 E. W. ATTWOOD. Oxford Chamber of Trade.
- 5*W. N. BACON, B.Sc., F.I.C., F.C.S. "The Paper Makers' Monthly Journal."
- 6 E. A. BAKER, M.A., D.Litt. University of London School of Librarianship.
- 7 J. N. L. BAKER, B.Litt., M.A. Oxford University School of Geography.
- 8 MISS H. A. BALL. International Standard Electric Corporation.
- 9 MISS S. BANN, Inter B.Sc. Rudolf Mosse Ltd.
- 10 E. A. B. BARNARD. George Philip and Son, Ltd.
- 11 A. R. BARNES. Medical Research Council.
- 12 MISS K. BAVERSTOCK. Leicester City Libraries.
- 13 DR. F. W. BENNETT, B.Sc.
- 14 MISS H. BENNETT.
- 15 MISS R. BENNETT, B.A.
- 16*S. BINNING, L.B.A. Nobel's Explosives Co., Ltd.
- 17*M. S. BIRKETT, O.B.E. National Federation of Iron and Steel Manufacturers.
- 18 BASIL H. BLACKWELL. B. H. Blackwell, Ltd.
- 19 W. BONSER, B.A., Ph.D. (a) Medical Sciences Library, University College, London.
(b) Folk-lore Society.
- 20 A. BRAUER. H. M. Stationery Office.
- 21 H. A. BROMLEY. National Union of Teachers.
- 22 J. W. H. BROWN. City of Oxford Education Committee.
- 23 A. C. CAMERON, M.A. J. Lyons and Co., Ltd.
- 24 MISS D. CATLEY. "Gas Engineer."
- 25*L. CLARKE. R. Clay and Sons, Ltd.
- 26 C. CLAY. Bristol University.
- 27 W. L. COOPER, M.A., F.L.A. H.M. Stationery Office.
- 28 W. C. COWELL. Bodleian Library.
- 29 A. E. COWLEY, M.A., D.Litt. Research Association of British Rubber Manufacturers.
- 30 T. R. DAWSON, M.Sc., F.I.C., F.I.R.I. Ministry of Labour.
- 31 MISS L. B. DIBBEN. London and National Society for Women's Service.
- 32 MISS V. DOUIE. National Institute of Industrial Psychology.
- 33 F. M. EARLE, B.Sc. "The Yorkshire Post."
- 34 JAMES J. EATON. Secretary, The British Museum.
- 35 A. ESDAILE, M.A. Leplay House.
- 36 A. FARQUHARSON, M.A. Cardiff Public Libraries.
- 37 H. FARR, F.L.A. British Library of Information, New York.
- 38 ANGUS FLETCHER. Royal Arsenal, Woolwich (Research Dept.).
- 39 MISS M. R. FLETCHER. New South Wales Public Library.
- 40 MISS M. FLOWER, M.A. Transport and General Workers' Union (Information and Statistical Dept.).
- 41 MISS E. M. FORCEY. Cross and Bevan.
- 42 C. J. J. FOX, D.Sc., Ph.D., F.I.C. North East Coast Institution of Engineers and Shipbuilders.
- 43*E. W. FRASER-SMITH, M.A. The Linnean Society of London.
- 44 LT.-COL. A. T. GAGE, C.I.E., M.A., B.Sc., M.B., F.L.S. Rowntree and Co., Ltd.
- 45*H. VINCENT GARRETT. Chiswick Public Library.
- 46 MISS M. GILBERT. (a) General Electric Co., Research Laboratories.
- 47 L. D. GOLDSMITH, B.Sc., F.I.C. (b) Association of Scientific Workers.
- 48 C. RAE GRIFFIN. C. Griffin and Co., Ltd.
- 49*W. R. GRIST. Leeds University Appointments Board.
- 50 B. M. HEADICAR, F.L.A. (a) London School of Economics and Political Science.
(b) Joint Standing Committee on Library Co-operation.

- 51 AMBROSE HEAL.
 52 L. HEBBS.
 53 MISS C. HENDERSON.
 54 F. HENN.
 55 MISS M. CLIVE HILDYARD, B.A.
 56 MISS W. C. HILL.
 57 F. A. HOARE.
 58 J. E. HODGSON.
 59 A. MOORE HOGARTH, F.E.S., F.I.S.A.
 60 C. H. HOOPER.
 61 P. S. HUDSON, B.Sc.
 62 MISS D. W. HUGHES.
 63 H. G. HUGHES, B.Com.
 64 E. WYNDHAM HULME, B.A.
 65* A. L. HUMPHREYS, F.S.A.
 66 R. S. HUTTON, D.Sc.
 67 MRS. R. S. HUTTON.
 68 A. B. HYSLOP.
 69 C. G. INGALL.
 70 H. L. JACKSON.
 71 HILARY JENKINSON, M.A., F.S.A.
 72 COL. E. L. JOHNSON.
 73 H. H. JOHNSON, A.M.I.Mech.E., A.M.I.E.E.
 74 MRS. H. H. JOHNSON.
 75 S. K. JONES, B.A., F.L.A.
 76 PROF. W. GARMON JONES, M.A.
 77 GUY W. KEELING, B.A.
 78 F. D. KLINGENDER.
 79 MISS D. KNIGHT, B.A.
 80 LAWRENCE KNOWLES.
 81 A. R. LAMBERT.
 82 B. N. LANGDON-DAVIES, M.A.
 83 MISS A. L. LAWRENCE, M.B.E., M.A., LL.B.
 84 P. EVANS LEWIN, M.B.E., F.L.A.
 85 MISS N. H. LEWIS, B.A.
 86 A. LOVE.
 87 E. E. LOWE, Ph.D., B.Sc., F.L.A.
 88 MISS C. S. LOWRY, M.A.
 89 COL. SIR HENRY G. LYONS, D.Sc., F.R.S.
 90 JOHN MCADAM, F.L.A.
 91 W. D. MACLAGAN, M.A.
 92* ROBERT D. MACLEOD, F.L.A.
 93 J. MACPHERSON, M.A.
 94 A. MARKHAM.
 95 MISS FLORENCE MARKS.
 96 EDWARD A. MARTIN, F.G.S.
 97 MISS H. METCALFE.
 98 MISS C. MITCHELL.
 99 BRIG.-GEN. MAGNUS MOWAT, C.B.E., M.Inst.C.E., M.I.Mech.E.
- Cross and Bevan.
 Research Association of British Rubber Manufacturers.
 The Imperial Institute.
 Birkbeck College.
 Royal Colonial Institute Library.
 National Union of Teachers
 Royal Aeronautical Society.
 College of Pestology.
 South Eastern Agricultural College, Wye.
 Rubber Research Institute of Malaya.
 Career Advisory Bureau and "Journal of Careers."
 Cotton Trade Statistical Bureau.
 British Science Guild.
 British Non-Ferrous Metals Research Association.
 Carnegie United Kingdom Trust.
 National "Safety First" Association.
 H. K. Lewis and Co., Ltd.
 (a) Public Record Office.
 (b) Royal Historical Society.
 Cleveland Scientific and Technical Institution.
 "Engineering," Ltd.
 Dr. Williams's Library.
 Library Association.
 Rudolf Mosse, Ltd.
 National Institute for Research in Dairying.
 Oxford Chamber of Trade.
 Conservative and Unionist Central Office.
 Mr. Noel Douglas.
 British Medical Association.
 Royal Colonial Institute Library.
 League of Nations Union Library.
 Venesta, Ltd.
 Leicester City Libraries.
 Agricultural Economics Research Institute.
 (a) Science Museum.
 (b) Geographical Association.
 Warrington Municipal Library and Museum Committee.
 "Library Review."
 Oxfordshire Agricultural Committee.
 (a) German Information Bureau.
 (b) Leipzig International Industries Fair.
 Horace Plunkett Foundation (Co-operative Reference Library).
 Croydon Public Libraries.
 Metropolitan-Vickers Electrical Co., Ltd.
 Labour Party and Trades Union Congress Joint Library.
 Institution of Mechanical Engineers.

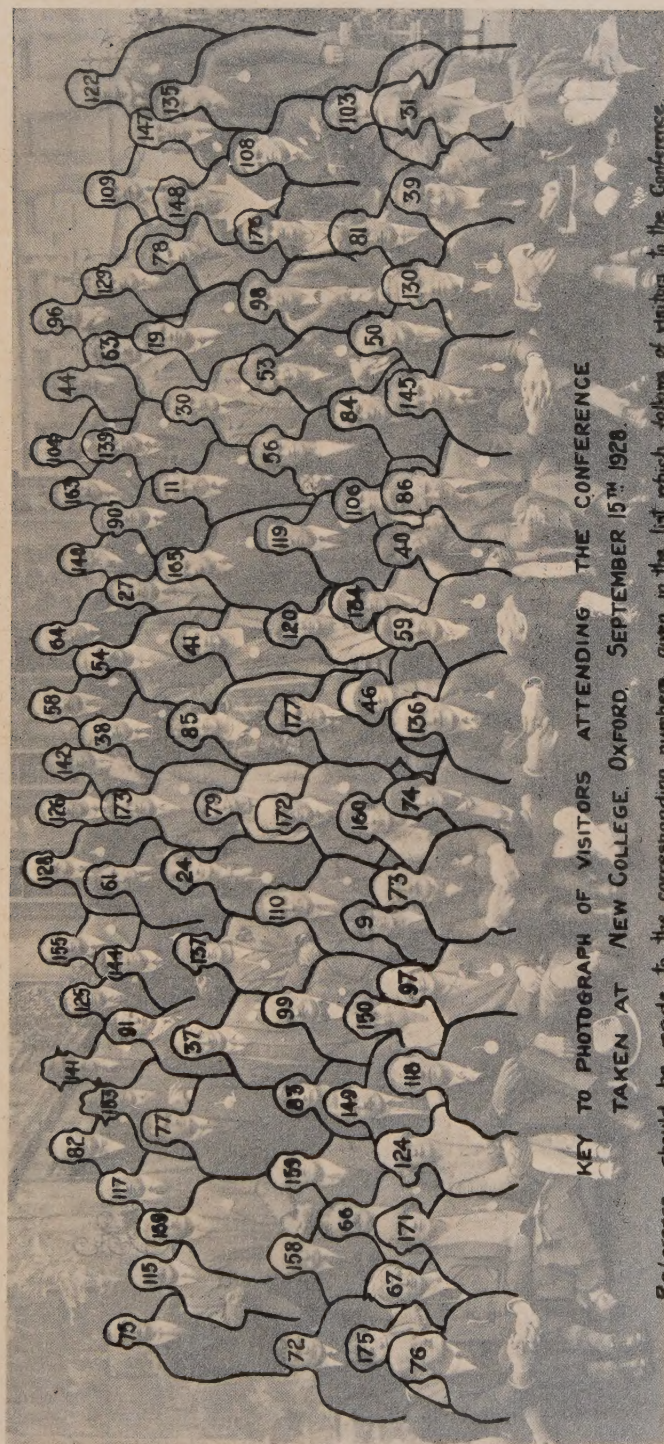
- 100*J. L. MYRES, O.B.E., M.A., Librarian, New College.
D.Sc., F.S.A.
- 101 R. H. NEW. The Clarendon Press.
- 102*J. T. WALTON NEWBOULD, M.A.
- 103 F. NEWBY. Royal College of Veterinary Surgeons.
- 104 LT.-COL. LUXMOORE Central Library for Students.
NEWCOMBE, T.D., F.L.A.
- 105 H. H. NICHOLSON. Agricultural Education Association.
- 106 MISS R. OMASH. Conservative and Unionist Central Office.
- 107 MISS E. W. PARKER. Mond Nickel Co., Ltd.
- 108 NORMAN PARLEY. Percy Lund Humphries and Co., Ltd.
- 109 G. H. PARRY, F.L.A. Liverpool Public Libraries.
- 110 J. G. PEARCE, M.Sc.(Eng.), British Cast Iron Research Association.
M.I.E.E.
- 111*COUNCILLOR J.O. PELTON, J.P. Croydon Public Libraries.
- 112 F. J. PEPLOW. Deptford Public Libraries.
- 113 C. E. D. PETERS. Oxford University Appointments Committee.
- 114 LT.-COL. J. A. A. PICKARD, National "Safety First" Association.
D.S.O.
- 115 S. S. PICKLES, D.Sc., F.I.C. Institution of the Rubber Industry.
- 116 A. T. PIKE. Garden Cities and Town Planning Association.
- 117 B. D. PORRITT, M.Sc., F.I.C., Research Association of British Rubber Manu-
facturers.
F.R.S.E.
- 118 H. POTTS, M.Sc. Convocation of Liverpool University.
- 119 A. F. RIDLEY, F.L.A. British Non-Ferrous Metals Research Association.
- 120 MRS. A. F. RIDLEY.
- 121*COL. W. RIGBY. Sugar Federation of the British Empire.
- 122 E. I. ROBSON, M.A. Institute of Agricultural Engineering.
- 123 DR. ROSENHAIN, F.R.S. National Physical Laboratory.
- 124 MISS M. RUSHTON. Metropolitan-Vickers Electrical Co., Ltd.
- 125 C. R. SANDERSON, B.Sc. National Liberal Club Library.
- 126 F. E. SANDRY, F.L.A. Association of Assistant Librarians.
- 127 W. C. BERWICK SAYERS, Croydon Public Libraries.
F.L.A.
- 128 G. SHAW SCOTT, M.Sc. Institute of Metals.
- 129 R. L. SHEPPARD. Bureau of Hygiene and Tropical Diseases.
- 130 LT.-COM. F. L. SHIPMAN, Dept. of Scientific and Industrial Research,
O.B.E. Building Research Station.
- 131 E. E. SKUCE. Oxford Public Library.
- 132*F. SEYMOUR SMITH. "Library Assistant."
- 133 COUNCILLOR W. H. SMITH. Leicester Public Libraries.
- 134 MISS E. SNOWDEN. British Thomson-Houston Co., Ltd., Chemical
Dept.
- 135 C. A. SPENCER, M.Sc. Dept. of Scientific and Industrial Research.
- 136 FOSTER SPROXTON. British Xylonite Co., Ltd.
- 137 MISS C. STENHOUSE. British Non-Ferrous Metals Research Association.
- 138 MISS E. STIFF. Royal Institute of International Affairs.
- 139 W. SWAINE, B.Sc. Institute of Ophthalmic Opticians.
- 140 L. T. THORNE, Ph.D., F.I.C. Institute of Brewing.
- 141 W. BENSON THORNE, F.L.A. Library Association: London and Home
Counties Branch.
- 142 A.P. THURSTON, M.B.E., D.Sc., M.I.Mech.E., F.R.Ae.S.,
M.I.A.E.
- 143*D. T. TIMINS, O.B.E., M.A., F.R.C.I.
- 144 A. H. TINGEY, B.A.
- 145 T. J. TINGLEY, B.Sc., Bureau of Information on Nickel, Ltd.
A.R.S.M.
- 146 E. H. TRIPP, Ph.D. Nitram, Ltd.
- 147 F. J. TRITTON, B.Sc., A.I.C.
- 148 MRS. S. M. TRITTON, F.I.C. (a) Research Association of British Paint,
Colour, and Varnish Manufacturers.
(b) British Society for International Bibli-
ography.

- 149 P. K. TURNER, M.I.E.E., M.I.R.E. Graham Amplion, Ltd.
 150 MRS. P. K. TURNER.
 151 M. G. TWEEDIE, A.M.I.E.E. Institution of Railway Signal Engineers.
 152 MAJOR L. URWICK, O.B.E., M.C., M.A. Management Research Groups.
 153 H. M. VAUGHAN, M.A., F.S.A. National Library of Wales.
 154 T. WADSWORTH, M.Sc. British Thomson-Houston Co., Ltd.
 155 JOHN WARNER, F.L.A. Newport Public Libraries.
 156 MISS M. WEATHERUP.
 157 R. F. WEST, M.C., B.A. Baillière, Tindall, and Cox.
 158 L. C. WHARTON, M.A. (a) Philological Society.
 (b) School of Slavonic Studies.
 159 G. B. WILLEY, A.R.S.M., F.I.C. Hadfields, Ltd., Research Dept.
 160 MISS E. B. WYNBURNE, B.A. (a) Institute of Metals.
 (b) Women's Engineering Society.
 161*H. ZETTERSTROM. Skefko Ball Bearing Co., Ltd.

SUPPLEMENTARY LIST.

- 162 ALDERMAN C. COOKSON, M.A. Oxford Borough Council.
 163 H. HUDSON DUMVILLE. Rowntree and Co., Ltd.
 164 A. JACOB DUNDAS. European Press.
 165 E. T. ELBOURNE, M.B.E., A.M.I.Mech.E. Business Information Index.
 166 PROF. R. T. GUNTHER, M.A., F.L.S., LL.D., F.R.G.S.
 167 R. H. HILL, M.A. Bodleian Library.
 168 MRS. A. B. HYSLOP.
 169 T. A. LEACH, M.A. Bristol University Appointments Board.
 170 DR. JACOB TER MEULEN. Librarian of the Palace of Peace.
 171 MISS I. DU P. REE. Brunner Mond and Co. (Research Department).
 172 H. ROTTENBURG, M.A., M.I.E.E. London Instrument Co., Ltd., Cambridge.
 173 T. P. RUSH. National Federation of Iron and Steel Manufacturers.
 174 F. H. WYNNE. Mines Department.
 175 MISS PRITCHARD.
 176 MISS M. G. WARREN.
 177 S. S. BULLOCK

* Prevented from attending.



KEY TO PHOTOGRAPH OF VISITORS ATTENDING THE CONFERENCE
TAKEN AT NEW COLLEGE, OXFORD, SEPTEMBER 15TH 1928.

Reference should be made to the corresponding numbers given in the list which follows of visitors to the Conference.

- 149 P. K. TURNER, M.I.E.E., Graham Amplion, Ltd.
M.I.R.E.
150 Mrs. P. K. T. ...
151 M. G. TWEDIE, A.M.I.E.E., Institution of Railway Signal Engineers.
152 MAJOR L. URWICK, O.B.E., Management Research Group.
M.C., M.A.
153 H. M. VAUGHAN, M.A., National Library of Wales.
P.S.A.
154 T. WADSWORTH, M.Sc., British Tabernacle Insurance Co., Ltd.
155 JOHN WARNER, F.L.A., Newport Public Library.
156 Miss M. WEATHERUP.
157 R. F. WEST, M.C., B.A.
158 L. C. WHARTON, M.A., (a) Philosophical Society.
(b) School of Slavonic Studies.
Hadfields, B.A., Research Dept.

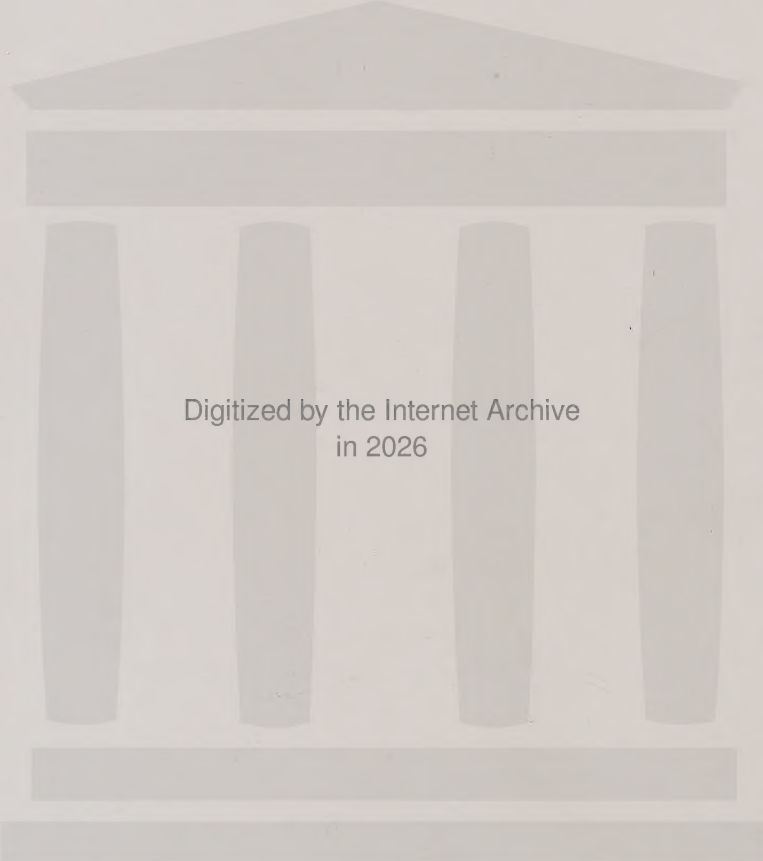
- 159 G. B. WILEY, A.R.S.M., F.I.C.
160 Miss E. B. WYNBURN, B.A.
161 H. ZEPHERSTROM.
(a) Institute of Metals.
(b) Women's Engineering Society.
Shefko Ball Bearings Co., Ltd.

SUPPLEMENTARY LIST

- 162 ALBERT C. COOKSON, M.A., Bedford Borough Council.
163 HUDSON DUMVILLE, F.I.C., Whitehead & Co., Ltd.
164 A. JACOB DUNDAS, European Press.
165 B. T. ELBOURNE, M.B., Business Information Index.
M.I. Mech.E.
166 P. R. T. GUNTHER, M.A.
167 L. L. D., F.R.G.S.
168 R. H. LILL, M.A., Bodleian Library.
169 Mrs. B. HYSLOP.
170 T. A. LEACH, M.A., Central University Agricultural Board.
171 D. J. JOSEPH MEULEN, Librarian of the Dept. of Peace.
172 MISS DU P. REE, Brunner Mond and Co. (Research Department).
173 H. ROTTENBURG, M.A., London Instrument Co., Ltd., Cambridge.
M.I.E.E.
174 T. P. DASH, National Federation of Iron and Steel Manufacturers.
175 F. H. WYNNE, Mines Department.
176 Miss MITCHARD.
177 M. M. G. WARREN.
178 S. C. RILLOCK.

* Deleted from list.





Digitized by the Internet Archive
in 2026

Editorial Note.

THE papers that follow constitute a record of the proceedings of the Fifth Conference of the Association. Except in the case of the Informal Discussions, written papers were, as a rule, prepared in advance by the speakers, and these have been reprinted in full. No verbatim reports of the discussions were made, but, with the aid of notes taken by the Chairmen of the meetings and provided by the various contributors to the discussions as full a report has been printed as the limitations of space permit. It should be noted that where contributions have been summarised because of this limitation any reader interested can see the full report at the ASLIB office. The editors take this opportunity to acknowledge their indebtedness to all those members of the Conference who have sent in notes of their contributions.

A special feature of this Report is that it contains an index covering the contents of the Reports of the four preceding Conferences. The value of all five Reports for purposes of reference is thereby increased. Copies of the earlier Reports are still available, and can be obtained on application to the Secretary.

During the week-end members of the Conference had opportunities to take part in conducted visits to the Clarendon Press, the Bodleian Library, the Lewis Evans Collection, and the Colleges. The thanks of the Association for these privileges are due respectively to the Printer, Dr. Cowley, Professor Gunther, and Alderman Cookson. Their kindness was very much appreciated.

26, BEDFORD SQUARE,
LONDON, W.C.1.

Contents.

<i>FRIDAY, September 14th.</i>	<i>Page</i>
RECEPTION at New College, and OPENING DINNER. Addresses by Dr. W. Rosenham and Mr. Angus Fletcher	14
GENERAL SESSION.	
Chairman : Mr. J. G. Pearce, B.Sc., M.I.E.E.	
(1) The Work of ASLIB. Dr. R. S. Hutton.	16
(2) Patent Law Reform, with Special Reference to the Search for Novelty. Dr. A. P. Thurston, F.R.AeS., M.I.A.E., M.I.Ae.E., A.M.I.Mech.E.	18
<i>SATURDAY, September 15th.</i>	
SECTIONAL MEETINGS.	
(A) Chairman : Mr. B. N. Langdon-Davies, M.A. (Mr. Noel Douglas). The Direct Reproduction of Books and Manuscripts. Mr. Norman Parley.	25
(B) Chairman : Mr. E. I. Robson (University of Oxford Institute of Agricultural Engineering). Certain Aspects of Agricultural Research. Dr. E. H. Tripp (Nitram, Ltd.).	34
(C) Chairman : Mr. P. K. Turner, M.I.E.E., M.I.R.E. The Literature of Scientific Management. Mr. J. Forbes Marsden.	40
INFORMAL DISCUSSIONS.	
(1) Existing Types of Indexes to Technical Periodicals. Mr. H. H. Johnson (Editor, "Engineering").	48
(2) Cartography and the Research Worker. Mr. J. N. L. Baker, B.Litt., M.A. (Oxford School of Geography).	52
THIRD ANNUAL GENERAL MEETING.	118
SECTIONAL MEETINGS.	
(A) Chairman : Dr. J. L. Myres (Wykeham Professor of Ancient History and Librarian of New College). The Librarian as Archivist. Mr. Hilary Jenkinson, M.A., F.S.A. (Public Record Office).	53

- (B) Chairman : Mr. H. Potts, M.Sc. (Chairman of Convocation of Liverpool University).
Vocational Selection and Guidance.
 Mr. F. M. Earle, B.Sc. (National Institute of Industrial Psychology). 59
- (C) Chairman : Lieut.-Colonel L. Newcombe, T.D., F.L.A. (Central Library for Students).
Unification of the Library Resources of London.
 Mr. A. Esdaile (British Museum). 65

SUNDAY, September 16th.

GENERAL SESSION.

Chairman : Colonel E. L. Johnson.

- (1) **Scientific Abstracts.**
 Dr. W. Rosenhain, F.R.S. (National Physical Laboratory). 73
- (2) **Civic and Regional Surveys : their Relation to Information Bureaux.**
 Mr. Alexander Farquharson, M.A. (Leplay House). 80

INFORMAL DISCUSSIONS.

- (1) **A Book-Review Digest.**
 Mr. C. Rae Griffin. 87
- (2) **The Durability of Paper.**
 Captain J. S. Allan (Messrs. Wiggins, Teape, and Co.) and Mr. N. Parley. 88
- (3) **Information on Accident Prevention.**
 Lieut.-Colonel J. A. A. Pickard, D.S.O., and Mr. C. G. Ingall (the National "Safety First" Association) 101

GENERAL SESSION.

Part I. Chairman : Mr. C. R. Sanderson (Librarian, National Liberal Club).

The Necessity for the Standardisation of Bibliographical Methods.

Dr. S. C. Bradford (the Science Museum). 104

Part II. Chairman : Brig.-General Magnus Mowat, C.B.E., M.Inst.C.E., M.I.Mech.E.

The ASLIB Directory. Lieut.-Colonel J. M. Mitchell, O.B.E., M.C., M.A. (Carnegie United Kingdom Trust). 114

RESOLUTIONS. 116

VOTES OF THANKS. 117

ACCOUNTS FOR YEAR ENDING JUNE 30TH, 1928 120

REPORTS FROM FOREIGN ORGANISATIONS. 121

COMBINED INDEX TO REPORTS of first Five Conferences. 129

Reception and Opening Dinner.

Dr. J. L. Myres, Librarian of New College, had kindly promised to address the members of the Conference at dinner. Unfortunately illness prevented Dr. Myres from attending. In his absence the delegates were received in the garden of New College by the Council of the Association, and, after dinner, short addresses were given by Dr. W. Rosenhain and by Mr. Angus Fletcher, representing the Special Libraries Association of the United States.

DR. ROSENHAIN said: "I feel in a very difficult position; I have not had the opportunity of attending previous conferences of this Association, and even the present Conference I have only attended to the extent of the dinner which we have just finished. So that I am peculiarly qualified by inexperience to tell you all about ASLIB and all that it can do and ought to do. I feel that I am rather out of my depth in such a gathering as this, because I am rather one of the users of information (perhaps I am occasionally a contributor by trying to add a little to it) than one who deals with its dissemination. But both as a user of information and as, occasionally, a contributor, I feel, and I think we must all feel, that the dissemination of information is an essential and vital step towards the use of that information; and, after all, that is where perhaps more in this country than anywhere else we need progress. It is right, I think, to say that, at any rate so far as physical sciences are concerned (and I think it applies probably to biological sciences as well) that there is no country in the world which contributes more new knowledge than does this country; but so far as certain branches are concerned we are not in such a satisfactory position. The reason is not, of course, solely a question of availability of information, but it is a question of that to some extent. Availability, of course, means not merely knowing where to find it or having it thrust upon one's attention—it has also got to be prepared for the consumption of the individuals who use it. If this Association does assist in the dissemination of that information in actually thrusting it before the eyes of those who ought to have it, and can also do something to render it, not more attractive, but more digestible, it would be serving a very great and real purpose. The information with which it has to deal is not merely the facts and data, opinions and views being put forward in this country, but those put forward throughout the world. Because, after all, information is essentially a world-wide product, and we require to know, not merely what is said and done and thought in this country, but what is said and done and thought throughout the world. We can achieve that result if we can secure adequate international co-operation. From that point of view I was interested to read only two or three days ago in the last issue of a great German technical engineering journal a whole page article on ASLIB. It was really quite satisfactory and interesting to see how fully continental people were not only aware of what is being done by the Association, but how they appreciated it, and how thoroughly they were in sympathy with its aims and methods. In fact, the writer of that particular article went so far as to point out that representatives from Paris and Brussels regularly attend these conferences, and expressed the hope that German organisations should also send their representatives. That, I feel, is a very real appreciation of the work which this Association has accomplished already, and if that work prospers and progresses as we all hope that it will and may, it should bear valuable fruit in many directions—among others, fruit of mutual understanding and appreciation of the work that is done by people throughout the world. In that hope, and in the hope that it will continue to do what it has begun and to do it in even greater measure, I can only say that I wish that this Association may prove in the future even more successful than it has been already."

MR. ANGUS FLETCHER said: "I regard it as a great privilege to be able to convey to you a message of good will from the Special Libraries Association of the United States. I would like to feel that this is not a merely formal greeting; I am sure that in no section of the community is the value of international understanding better appreciated than in the profession of the librarian.

"You may perhaps be wondering why it is that this message should come through me. It is because, as Director of the British Library of Information, I have had the privilege of being elected President of the Association in New York. That library, as you may know, was established some eight years ago by the British Government as a means for making available in the United States current official information on the affairs of the British Empire. It comprises a special collection of British publications and standard works of reference.

"I should like, Mr. Chairman, to congratulate you on the privilege you enjoy of being able to meet in these beautiful and congenial surroundings. We have to meet usually in those vast caravanserais—the American hotels—which, while replete with all the latest modern conveniences, are not remarkable for their peace and quiet.

"I want finally to congratulate you very sincerely on the wonderful Directory which you have produced. I am taking a copy back with me to circulate at our local meetings and also at our annual convention. I hope that with your example and your experience before us our Association may be able to undertake similar productions for the United States."

It was a great pleasure to the delegates when, on Saturday, Dr. Jacob ter Meulen, Librarian of the Palace of Peace at the Hague, arrived unexpectedly at the Conference. After lunch on Sunday Dr. TER MEULEN, at the request of the CHAIRMAN, spoke briefly to the Conference. He said:

"I felt yesterday how nice it is sometimes to float on the ocean of life, not only without any luggage, but even without a real purpose. Three hours before I arrived here I had no intention of attending your Conference. I had not thought of coming to Oxford. While my visit is accidental, I should like to say how pleased I am that I am able to spend a few hours among you.

"The last time I was in England was in July, 1914, at the time of the Sarajevo murder. I was then working in the Reading Room of the British Museum studying the history of the idea of the League of Nations, an idea which was a very old one, as you know. A few weeks later the war broke out, and after the war a League of Nations was established. We do not know whether this League of Nations will succeed. We only know that its success depends upon the moral forces behind it. Amongst those moral forces I count intellectual co-operation, and amongst those moral forces I count also the work of your Association.

"Although having no positive mandate, I may express, in the name of my colleagues in Holland, my best wishes for the prosperity of your Association and the excellent work you do for the benefit of mankind."

The Work of A.S.L.I.B.

DR. R. S. HUTTON.

The last year has been a very eventful one indeed for the Association and I have been asked to start our Proceedings by giving members and visitors a brief review of what has occurred since our last meeting.

In the first place mention should be made of the incorporation of the Association on the lines approved at our last Conference, so that now ASLIB exists as a properly constituted institution.

There has been a considerable increase of membership since the previous Conference, and the total is now just over 400, but it is impossible even to retain the existing staff and continue our present work without a much more rapid rate of increase in membership, and all are asked to help in this objective.

During the first years of our existence we depended on an annual grant from the Carnegie United Kingdom Trust, but now we have to be self-supporting. Surely we can look to many of our industrial members for more than the minimum subscription rate, and, in particular, we ought to secure a large membership from the general and technical Press of the country, which itself is so constantly occupied in the collection and distribution of information. One would imagine that one of the many enquiries they would be entitled, during the year, to make to ASLIB, as to a "source," would frequently be worth the full annual subscription.

THE DIRECTORY.

By far the most important event of the year has been the publication of the ASLIB Directory, which is now on sale.

The splendid encouragement and financial support of the Carnegie United Trust alone made this great venture possible.

The Directory forms a tangible proof of the valuable work which ASLIB is undertaking, and I am sure that all the members feel very proud that we can look upon it as our own possession, thanks to this generosity of the Trustees.

The main details of collecting and compiling the matter received for the Directory had been planned by Mr. G. F. Barwick and Miss Durrad, but owing to their illnesses a vast amount of work in seeing the Directory through the Press was left to Miss Warren, and we have, in particular, to thank Mr. E. W. Hulme, who most generously spent much time and trouble on the final editorial arrangements.

Members should realise that there is a great deal more information on sources available to them than actually appears in the printed Directory. Supplementary matter which had been received just before publication and since that date is filed in the office, and it is earnestly hoped that the Association will be given sufficient support to continue the collection and classification of new sources and those inevitably missed in the first compilation. The right to use the Association for getting in touch with this supplementary information should alone warrant the continued support of all our present members and lead to a large increase in membership in the years to come.

SECRETARIAT.

Some other events of the past year have rather interfered with the steady progress of our work. Mr. G. W. Keeling, after three years' service, resigned his appointment as Secretary to join the Library Association. He was our first Secretary, and has done most valuable work for ASLIB, and I am sure that members will be pleased to see him with us to-night.

As the Council wished to make a wide search for a new Secretary, Miss Warren was appointed temporary Acting Secretary, and in this work and in all her editorial assistance has given most loyal and ungrudging help to the Association.

After selection from a large field of candidates, Mr. S. S. Bullock was offered the appointment of Secretary, and took up his duties early in June. Mr. Bullock comes to us with a record of good service in other spheres, and, although up to the present he has been chiefly occupied with arrangements for the Conference, the Council feel confident that the work he has started for us in other directions will soon make itself felt to the benefit of the Association.

Another event of the past year has been the removal of the Association's offices to 26, Bedford Square, where we occupy premises adjoining those of the Library Association. It is hoped that this proximity may facilitate friendly co-operation between the two bodies, and it will be noted that this is only a partial fulfilment of Colonel Newcombe's scheme put before our Conference in 1926.

Quite apart from the question of office accommodation, contact has again been made with the Library Association during the past year. A deputation of members of the Council was invited to meet representatives of the Library Association with a view to discussing suitable means of co-operation. A preliminary survey of the position has been made, and it is hoped that other meetings will be held. The Council has always approved of the fullest exploration of lines of possible co-operation, but until some tangible scheme appears it is impossible to discuss the subject in a large open gathering.

WHAT OF THE FUTURE?

Personally, I feel that the work of ASLIB has only just started.

The Directory is a splendid asset, but it is also a heavy liability in that having built up the organised collection of "sources" it is most important to keep it up-to-date and make the appropriate additions. From the day of publication, as was anticipated, omissions have been brought to our attention. The Council earnestly hopes that you will provide them with the means for retaining Miss Warren's services, so as to assure the necessary continuity in this branch of our work and keep open the prospect of new and important additions to the Directory.

There are, however, numerous other reasons for the continued existence and growth of ASLIB.

The Annual Conference has become quite an important fixture in the life of many of our members. We look forward to it because it forms a unique gathering of individuals engaged in the most diverse professional occupations.

In successive Conferences a number of other projects have been put forward, which, now that the Directory is established, certainly should be reviewed. For instance, we have been asked to organise panels of expert translators, amongst perhaps a dozen other proposals, more or less attractive.

Probably the most frequently recurring common interests which exist amongst our members are two-fold. Firstly, the securing for some specific purpose of reasonable completeness of information, maybe from world-wide sources, and, secondly, the presentation of the information so gleaned in an assimilable form. Even under ideal conditions these tasks are great, but they are frequently made more difficult when the information is to be brought home to individuals who are none too ready or anxious to receive it! The discussion of these problems in public meetings and by the possibilities of individual intercourse which our Conferences provide will for long give us reasons for wishing to come together at least once a year.

RECENT RAPID PROGRESS.

If we look back only a few years and note some of the great developments which have taken place we shall certainly feel encouraged that so much progress has been achieved within the field of our interests. In many of these events ASLIB has not been directly concerned, but the stimulus and help afforded by such Conferences as we hold undoubtedly plays an important part far outside our own confines.

Without entering into detail I should like just to mention a few of the important aids to Special Libraries and Information Bureaux which have been achieved or shown great advance since the formation of ASLIB:

The World List of Scientific Periodicals.

Central Library for Students and its Outlier system.

The Science Library: notably the great increase in its supply of scientific periodicals.

The Report of the Public Libraries Committee: The first movement towards a Central Building for kindred Library Bodies.

The ASLIB Directory.

As a further instance of the increasing desire to collect all available information on specific subjects, it may be mentioned that during the last twelve months two private industrial Information Bureaux have been started in this country on one single metal alone—*uranium*, nickel.

Patent Law Reform with Special Reference to the Search for Novelty.

By A. P. THURSTON, M.B.E., D.Sc., M.I.Mech.E., F.R.Ae.S.,
M.I.A.E., Registered Patent Agent.

1. It has always been to me a matter of pride that I was once on the examining staff of H.M. Patent Office. At that time I was greatly impressed with the ability and devotion to duty of my colleagues. Since I have been a patent agent I have had opportunity of seeing the office in another light, and I am still more impressed both with the devotion to duty and with the remarkable accuracy and value of the work of the staff of His Majesty's Patent Office.

This being so it will be understood that nothing in the following remarks is to be taken as a criticism of the Patent Office or its officials.

2. I think it will be granted without question that the genuine inventor is potentially one of the most valuable members of the community, and that the future progress and prosperity of our country may be greatly influenced by the number and type of the inventors which it will produce.

Unfortunately the inventor oft-times belongs to a type of humanity which readily lends itself to exploitation. Even the Patent Office makes an annual profit of many thousands of pounds sterling (in 1927 it was £112,939 3s. 9d.) out of the inventor, which it hands over to the exchequer. Is this to punish the inventor for conferring great benefits upon the nation at large? The present regulations appear to be largely directed to divorcing the inventor from his rights in his own invention at the earliest possible moment in order to benefit someone other than the inventor.

3. The old view of patent law was that patents were special privileges granted by the Crown to individuals undertaking the introduction of new industries in recompense for the expenditure of the time, energy, and capital inseparably associated with the introduction of new industries. Hence it is clear that patents are not granted solely for the benefit of the patentee, but also for the benefit of the public at large.

If any regulation prevents, obstructs, or deflects patentees from the task of devoting their time, energies, or resources to the introduction of new manufactures, then it would appear *ipso facto* that that regulation is defeating the purposes of the patent grant and is bad in principle. It is definitely certain that it is not the duty of the Patent Office officials to regulate the law to suit their own convenience.

4. Mr. Harold Cox has laid it down as an axiom that no Government office should be permitted to show a surplus continuously, as sooner or later this surplus will be absorbed by the office. Recent articles in "Nature," apparently inspired by the Patent Office, have been directed to show how the Patent Office surplus should be diverted into official channels. Examination for novelty is to extend into new fields—with a new proviso introduced that "what we don't know

isn't knowledge." It never seems to have occurred to the writer of these articles that the inventor has the first claim upon the Patent Office surplus.

5. For the purpose of opening a discussion I propose to make, as the result of my experience as examiner, patentee, and patent agent, a number of suggestions devoted to means for encouraging invention and manufacture. For convenience I have grouped these suggestions under three heads :

- (1) Patents should be cheaper to obtain and to maintain.
- (2) The granting of a patent should be a hall mark of its soundness, so that a manufacturer or financier might with safety risk his money without fear of the patent being upset.
- (3) Better facilities should be provided to protect the inventor, and something should be done to reward the inventor or discoverer.

6. CHEAPER PATENTS.

There are a large number of inventions for small details or minutiae which do not on the face of it appear to justify the expense and trouble of a full patent. Nevertheless, the manufacture of these articles would benefit the public. Such cases could be dealt with by petty patents, which could be granted for a small fee without search for six years, say. Such a system is in operation in Germany. A petty patent, or Gebrauchsmuster, is issued for three years, renewable for three years without search (except to see that there is only one invention) for a fee of 15 marks.

The popularity of this provision may be judged by the fact that in 1927 there were 41,000 petty patents granted, against 14,072 full patents. The total number of petty patents to the end of July is 1,039,300. In my opinion similar facilities in this country would be of benefit both to the inventor and the public, and would lead more people to become manufacturers.

7. A patent to be valid must be novel. Under the Statute of Monopolies the definition of novelty was limited by "user" within the realm, but since the ruling of Lord Mansfield in 1778 the legal standard of novelty has been raised from the practice of the art to proof of absolute novelty within the realm. Nevertheless, the official search is only partial, and is limited to British Patent Specifications for fifty years prior to the application. The annual loss to industry and commerce due to the retention in patent law of this uneconomic standard of novelty is undoubtedly enormous.

8. If ample safeguards are provided to prevent fraud and better opportunities of opposition are given over a prescribed period, it would appear to be a simple matter to provide means enabling a patentee, say five years after his first application, and as soon as his invention is being worked on a commercial scale to obtain a certificate which would stop anyone from attacking his patent on the ground of want of novelty, unless the anticipation is that of "prior user."

This change would give the patentee as founder of a new industry a *substantial guarantee of the validity* of his patent, and would thus remove the principal obstacle in the way of commercial development of patents—viz., want of security for capital invested.

It would also effect a substantial reduction in the cost of the official examination and presumably reduce the cost of a patent.

9. British patents are among the most expensive in the world owing to the annual renewal fees after the fourth year. When the life of a British patent was extended from fourteen to sixteen years in the 1919 Act, additional annual fees of £15 and £16 were added, and no corresponding extension of the period of exemption from the payment of renewal fees was made.

It is suggested that patents may be cheapened and their value in starting up new manufactures enhanced by :

- (a) Extending period of exemption from four years to six years.
- (b) Limiting the search on the present lines for a period of five or six years and to all subsisting patents prior to this period. This will limit the search to a period of not more than sixteen years.

10. The Patent Office Examiners are uncannily efficient in citing paper anticipations and in construing broad statements as anticipations, although it is perfectly obvious to any practical man—and they themselves are often willing to acknowledge it—that no such thing as the particular invention could have been in the mind of the prior patentee at the date of writing his specification. Obviously the examiner cannot risk the danger of being accused of missing anticipations or of securing inadequate amendment. It is, therefore, desirable both in their interests and in that of the public that the scope of their search should be clearly defined within the narrowest limits.

Sir John Dewrance, K.B.E., in his presidential address to the Institution of Mechanical Engineers in 1923 has made a number of very pertinent and valuable comments on the present operation of the patent law.

He points out that “the inventor used to be advised to make the wording of his specification wide enough to provide for possible developments, and the document when read as an anticipation of a subsequent inventor may be held to have a meaning that was never realised when the specification was prepared.” “I have known such specifications quoted forty years after being filed, during which period there had been no use in accordance with the specification.” He then shows how one of his own patents was destroyed by means which it is considered are not to the benefit of the public.

It would appear in effect that the present policy of the patent law is to thwart the inventor in every way possible, to cut down his protection as far as possible, to make it as expensive as possible for him to protect his rights, and if possible to destroy his rights altogether.

If inventors and manufacturers were given more opportunity of expressing their views on questions of patent law, it is thought that a much better working scheme could be obtained for increasing and improving the arts and manufactures of the realm.

11. BETTER PROTECTION FOR THE INVENTOR.

It is notorious and perhaps natural that there is great dishonesty in the transmission of intellectual ideas—“conveyance” the wise call it. An idea is passed from one brain to another without record, and the receiving brain is perhaps unconscious of the source. Proof of conveyance should give the first inventor some benefit to the invention.

12. Many manufacturers, exploiters, and Government departments manage to become acquainted with an applicant's invention, and then proceed to discourage him from completing his application. If such an application is dropped before the specification is published the invention may be taken up by somebody else, and this other person may obtain a valid patent for the invention owing to the difficulty experienced by the first inventor in proving communication and publication. Many Government departments are now trading organizations, in some cases provided with their own patent departments, for taking out patents, for opposing rival patents, and for acquiring patents, all at the nation's expense. Something should be done to protect both the public and the inventor from irregularities or errors of judgment. It is obviously undesirable that the first inventor should be induced or, for patriotic reasons, allow his patent application to lapse to prevent the invention becoming the property of foreigners, and that public moneys should afterwards to be paid to another and later applicant, who may, perhaps, have obtained his idea wholly or in part from the first inventor. It is an undecided point in law whether in such a case the real inventor can be stopped from using his own invention because of the later patent. I have come across several instances of cases on these lines in which inventions have been submitted to a Government department or manufacturers and rejected by them and abandoned by the applicant, and afterwards re-patented by others. The remedy appears to be to add another ground for opposition or to provide facilities for the original inventor to exercise his invention independent of the patent, such as by a compulsory free licence.

I would suggest either that a patent should be held invalid, if it could be proved that the same invention had been submitted to a Government department or a manufacturer within five years of the date of the later application, or that the first inventor should be entitled to claim a certificate freeing him from the danger of infringement proceedings by the patentee, and giving him the right to manufacture according to his original invention.

13. DEPOSITED INVENTIONS.

This leads me to another and further proposal.

It is well known that one advantage in taking out a patent is to free a manufacturer from the danger of being attacked by another and later inventor who has secured a patent. It is often difficult to prove when an invention was first made. A valuable service would be rendered to manufacturers and inventors if machinery were provided to allow them to file documents to register the date of an invention without giving them a monopoly right. I would call these inventions "deposited inventions."

This might be done by filing a complete specification and surrendering the benefit to the public. The law might be altered and enable such specification to be filed at a reduced fee and retained in the examiner's files for a prescribed period.

14. One of the grave difficulties under which inventors and manufacturers labour is absence of knowledge of the state of the art in any field in which they are interested. Londoners perhaps suffer

less from this difficulty than other citizens, owing to their possession of the Patent Office Library. Searches, however, through the files of the Patent Office Library are unnecessarily complicated, and ASLIB carried resolutions last year at Trinity College, Cambridge, with a view to simplify greatly public search.

15. SUMMARISING.

For the purposes of opening a discussion, my suggestions are :

- (a) Grant of petty patents for three years without search renewable for three years, filing fee, say, £1.
- (b) Search on present lines for five or six years prior to date and beyond that period limitation of search to subsisting patents.
- (c) Limitation of "prior publication" as a ground for revocation to "prior user" five years after the date of a patent in cases where proof of working is established.
- (d) Extension of grant of patent in first instance to six years and reduction of fees in general, including abolition of sealing fee.
- (e) Facilities for filing documents of "deposited inventions" to secure date without monopoly right.
- (f) Increase of damages obtainable in charges of fraud to discourage the general use of this ground of opposition without a *prima facie* case, and amendment of regulations as to secret patents to prevent the use of these provisions for the purpose of avoiding opposition on any of the usual grounds by keeping prior inventors in the dark.
- (g) Some provision should be made to reward scientific discoveries when discoveries are of proved commercial value to the nation, the annual surpluses of the Patent Office to be earmarked for this purpose.

DISCUSSION.

In opening, Dr. Thurston read a number of written comments which he had received.

COLONEL W. H. D. CLARK, late chief examiner of the Patent Office, expressed general agreement with Dr. Thurston's views. He had been impressed by the difference of view of those dealing industrially with patents and of the Patent Office officials, bound by Statute and Case Law. His experience with great industrial concerns had convinced him of the urgent need for many alterations in the law and practise of patents. He thought that any profit made by the Patent Office should be employed towards the cheapening of the cost of patents, the cheapening of publications (specifications, journals, etc.), and the extension of the search. His experience was that financiers were more confident in the validity of German and U.S. Patents (as regards novelty) than of British patents. He thought that it would be immensely beneficial if there could be more assurance that a granted patent, in respect of an assuredly and technically successful invention would not be liable to be upset by "paper" anticipations.

MAJOR THE HON. H. FLETCHER MOULTON wrote that the Committee of the British Science Guild, which had been considering possible improvements in Patent Law, were making recommendations in their report which coincided in a good many respects with Dr. Thurston's. Personally he attached considerable importance to the proposal that we should adopt a change in the law, approximating to that in force in the U.S., by which publication by the inventor himself should not invalidate a patent if application were made within a period of, say, six months.

MR. H. PORTS said that many manufacturers did not want patents, and regarded them as a nuisance. He thought it would be a great mistake to dispense with paper anticipations as a ground for opposition, and to make patents unassailable except on grounds of prior use. Lack of education was the defect of the patent system, and the great expense of high court actions.

MR. ROTTENBURG referred to some of the hardships of manufacturers and inventors. He cited the case of the bogus infringer, without assets, being set up to infringe a patent in order to cause the inventor to waste his means in attacking the man of straw. He wanted some means of awarding the inventor who is before his time, and often receives no recompense for inventions of great value and importance.

MR. E. W. HULME said that, whereas Dr. Thurston had emphasized that Patent Law must not be moulded by the Office to suit official purposes, a few instances would show what considerations underlay the changes during the last fifty years. The Treasury wanted increased revenue and the Patent Office extended functions. In 1883 the law restricting patents to one invention came into force, thus doubling and trebling the cost of protection to the inventor. The change was made to suit the convenience of the Indexing and Abridging Staff, and no doubt the Treasury thought they, too, had done a smart bit of business. But had they? One successful industry can in one year pay in the form of income and super tax the equivalent of the entire Patent Office surplus. Whereas the high cost of protection sends the inventor in quest of a better market, ours was formerly the best market for the inventor, but now it is one of the worst. It was probably some mathematical genius at the Treasury who introduced the annual renewal fees in 1883. Either he wanted more revenue or he wanted to jockey the inventor out of his patent at the earliest moment, so that rival manufacturers might profit by his brains. Now in 1883 English and American Patent Law were very much alike in their theoretical basis, but note the difference in practise. Under the United States law patents are granted for seventeen years, and there are no renewal fees. He was not a great admirer of the American system; but no one could dispute the consistency of the system and its generous attitude towards the inventor. Our law wobbles frequently and the official attitude is niggardly and very short-sighted. One more instance of the moulding of the law to suit official convenience. The limitation of the English search to fifty years was fixed to suit the requirements of examiners, and to round off the official search it was enacted that matter not included on the examiners' files (including published provisionals) could not in future be cited as anticipation in the courts. This, of course, is sheer nonsense. It is an established principle of our constitution that a grant by the Crown which is devoid of consideration is void in law, yet the Patent Office can grant patents for inventions disclosed in the Blue Books, and the Blue Books cannot be cited as an anticipation in the courts. If, as he believed was the case, the law has operated without inconvenience, the system of examination stood condemned, for if the Law of Novelty could be treated in this cavalier fashion the principle might be further extended in favour of the patentee who honestly works his patent on a commercial basis, and examination for novelty could be correspondingly abridged. But this relief could not properly be given to the patentee who relies upon disclosure.

MR. P. K. TURNER remarked that he represented an organisation which not only invented, but also manufactured, granted licenses, and paid royalties to others. He agreed strongly that reform was needed, but felt that proposals for less search and greater difficulty in attacking a patent were incompatible. He thought that there should be either (a) a much more vigorous search (not confined to patent literature, but covering also the general literature of the art concerned), coupled with an almost unassailable patent, or (b) a cheap and light search, leading to a cheap patent, coupled with an equal cheapness and ease of attack. Preferably both should be provided, as under the suggested scheme of petty and major patents.

MR. A. MOORE HOGARTH, MR. B. M. HEADICAR, and MR. A. H. TINGEY also took part in the discussion.

In the course of a written communication, in criticism of Dr. Thurston's paper, received from MR. OSWALD COX, he said that the Patent Office fees were not excessive. The preliminary work before granting a patent was carried out at a loss, the profit being made out of renewal fees which, generally speaking, would not be paid unless the invention was proving a commercial success. These fees were paid by manufacturers rather than by inventors, and it was not unreasonable that, out of the profits made from the community, the manufacturer should make a small contribution to the Exchequer. The fact that 35,000 patents were applied for every year did not suggest that many inventors were deterred by high Patent Office fees. More information was wanted about the German Petty Patents. Did they give monopoly rights to the inventor? Were they indefeasible in a court of law? If so they must be a source of considerable trouble to manufacturers who might have been using some detail for years, suddenly to find that

a petty patent for it had been granted to some so-called inventor without investigation as to its originality. While the official search for anticipations should be extended, the Patent Office should not have the final word on the question of novelty or validity. The final voice should be the judicial voice. He deprecated the suggestion that Government Departments steal inventions submitted to them in confidence. He had investigated charges of this kind, and, on every occasion, had not found the least justification for the accusations.

Dr. THURSTON replied briefly to some of the points raised in the course of the discussion, and, at the end of the meeting, the following resolution was passed, on the motion of Dr. THURSTON, seconded by Mr. P. K. TURNER: "That this meeting desires to impress upon the Government the need for an inquiry into the working of the Patents Acts in relation to the industries of the country and the relief of unemployment."

REPRODUCTION
OF BOOKS AND
MANUSCRIPTS



SHAKE-SPEARES

S O N N E T S.

Neuer before Imprinted.

AT LONDON

By *G. Eld* for *T. T.* and are
to be solde by *John Wright*, dwelling
at Christ Church gate.

1609.

every day the 4th of September was kept in prayer and thanksgiving for this happy freedom as the birth of Jesus. Bro. Bungan appointed also that every day next be kept in prayer & thanksgiving on the same amount. [the first asleep in Jesus August 31. 1688]

Friday 18th of Septm. was of what Congregation most to thank to them
before God by offering & prayer for the Holy & Severe Struck upon us
taking away one Honoured Bro: Buryan by death
It was agreed also at 4th same meeting by the whole Congregation that vote 6
be taken to work out for one suitably qualified to be chosen an Elder
amongst us: and that care way committed by the whole to his Bro: in Godness

There was also motion to the congregation to ease of speech. Wilkerson: was then thought wise to be deferred until another time, fact that there was now the great mighty Confessing depending amongst them.

Wednesday 30th of October is observed for a day of humiliation, I pray for John Wilkerson desired all Confessors with the support of the Brothers as they were, John Greber John Bardsley & others in order to his manifold sins of Repentance as was hoped but to no purpose there showing Great Repentance and sorrowed in a way and vindicting the flesh.

Trigonometry, the calculation of triangles drawn on a sphere, a subject which has to be studied in connection with Navigation and Astronomy. We come across many practical problems in which the measurements are in space, problems in which the figures appertain to solid instead of plane geometry, and to these the methods we are learning, of Plane Trigonometry, can be applied. There is one precaution you should always employ in these problems; after drawing a rough figure—which must of course be in perspective—draw out the right-angled triangles from which your calculations are to be made. Do not try to calculate from the perspective figure.

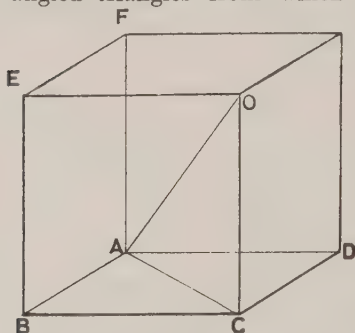


FIG. 18.

This is, therefore, what we have to calculate.

Draw out, firstly the square $ABCD$, secondly the triangle OAC .

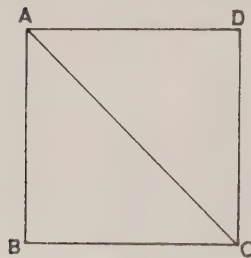


FIG. 19.

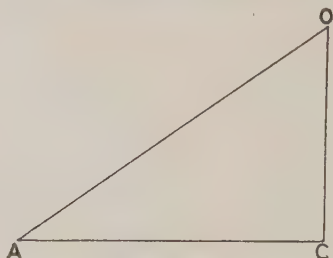
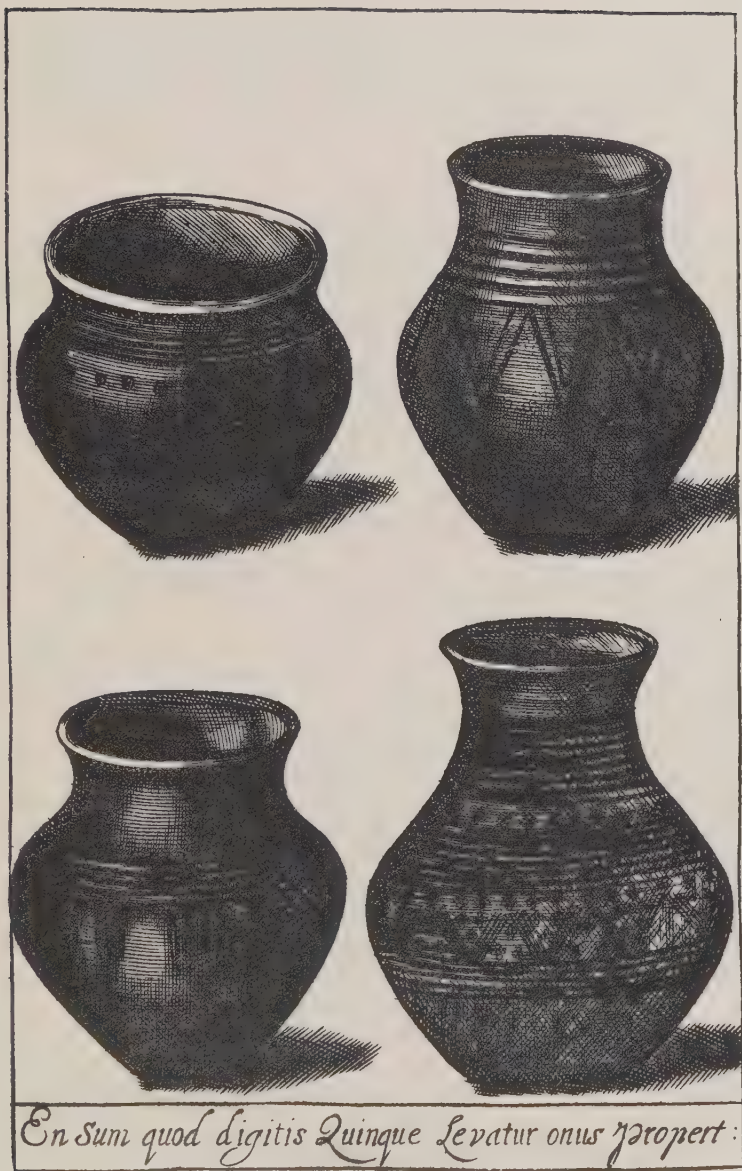


FIG. 20.

We are not told anything about the size of the cube. Let us assume, therefore, that its side is of length a .

$$AC^2 = a^2 + a^2 = 2a^2;$$



En Sum quod digitis Quinque Levatur onus p̄roperit :

ILLUSTRATION from 'HYDRIOTAPHIA. Urne Buriall,' by THOMAS BROWNE, D. of Physick. First Edition, May 1658. British Museum copy. Press-mark E.1821 and 959.a.15. Reproduced by REPLIKA Process. By permission of Mr. NOEL DOUGLAS.

AREOPAGITICA;²
 A
 SPEECH
 OF
 Mr. JOHN MILTON
 For the Liberty of VNLICENC'D
 PRINTING,
 To the PARLAMENT of ENGLAND.

Τὴν δ' ὁρῶν δ' ἐκείνο, εἴ πεθέλει πόλιν
 Χρηστὸν π' βέλδι μ' εἰς μέσση φέρειν, ἔχων.
 Καὶ ταῦθ' ὁ χερζῶν, λαμπροῦς ἐὼς, ὁ μὴ θέλων,
 Σιγῇ, τί γέπων ἐστὶν ἰσχυρὸν πόλιν;

Euripid. Hicetid.

Ex dono Authoris

*This is true Liberty when free born men
 Having to advise the public may speak free,
 Which he who can, and will, deserv's high praise,
 Who neither can nor will, may hold his peace;
 What can be juster in a State then this?*

Euripid. Hicetid.

Novemb. 24. LONDON,
 Printed in the Year, 1644.

Reproduction of Books and Manuscripts.

By NORMAN PARLEY.

(i) INTRODUCTORY.

Any book, of which a reasonably good copy exists, can now be reproduced quickly, efficiently, and economically by a combination of photography and modern book printing methods. Before describing this development a brief survey of what is being attempted in other directions bearing on book printing may be given.

In the realm of book production movable type has now held undisputed sway in Europe, through its reigning families Roman and Gothic, for nearly five hundred years. Gutenberg was literally its founder when in 1454 he used his newly invented type to print the Mazarin Bible, a copy of which is in one of the King's Library show-cases in the British Museum.

At the frontier of this hitherto unthreatened kingdom are now encamped the allied forces of the photo-composers (under "August-Hunter," "Typary," and others), and the users of flat-printing-surface machines. The project has attracted many minds. Its objective is to depose type and to provide copy ready for reproduction by offset or rotary gravure machines. The problem from that point onwards has been solved, as will be shown below, but the technical difficulties of such photographic type-setting are evidently great, and, notwithstanding all the ingenuity that has contributed to their present state of development, any movement on the grand scale seems still to come.

Less revolutionary, yet ambitious, is "Pantone," a development of printing surface which aims at producing the finest half-tone results on any paper, and on ordinary letterpress printing machines. If successful this would do away with the need for so-called art papers for half-tone illustrations. The subject to be printed is put to the flat metal surface photographically, and is "bitten" in. A metallic compound is carried in the ink which, it is claimed, reduces the wear and tear on the plate during running. Results on a commercial scale seem not yet to be forthcoming, and the process can hardly be considered a serious competitor at the present time.

To turn to established methods, collotype remains incomparable for the most perfect reproductions of manuscripts, documents, and book illustrations, and such famous Presses as the Clarendon and the Chiswick are producing superb results by its means. Printing from a gelatine surface, however, in such a climate as ours, is a delicate task; speeds are low, at most 700 a day as against the 8,000 or more of letterpress and offset machines, and costs necessarily high. There remained, therefore, room for some new process able to reproduce not only the "line" of the writing or print of manuscripts and documents, with photographic accuracy, but also the tone and texture of the paper. This can now be done at figures which are comparatively very low indeed, as will be seen in Appendices I, II, and III.

"Collography," "Collogravure," or "Argentography" is a modified form of collotype, using flexible film instead of glass as a

basis for the gelatine printing surface. It has been revived several times, but has never come into general use. "Ink-Photo" is a private photolithographic process, using a grain somewhat coarser than collotype, which is very successful in rendering chalk or crayon drawings. It is in use by publishers dealing with architecture.

Before going further a few words may be in place on blocks (zincos, electros), moulds, and stereos. The cost of zincos is fixed in this country by the Federation of Master Process Engravers at rates which some consider high. Ordinary open line work on zinc, such as a librarian would use for straightforward catalogue illustrations, cost 6d. per square inch; minimum, 7s. Thus, a zinco for a page of a cr. 8vo book (as Appendices I and II) costs 12s.; or a "fine script" zinco, at 8d. per square inch, for a royal 8vo. page of MS. (as Appendix III) costs £1 6s. 8d. These figures put zincos out of the question for the text of books, although useful for line illustrations.

Moulds are papier-maché impressions from type; stereos are metal plates cast from those moulds. Moulds of an ordinary book (cr. 8vo. 320 pp.) cost £15, and stereos £34. Publishers have to decide within about three months after printing a book whether they will distribute the type, pay rent for it to be kept standing, or make moulds, from which stereos can be cast if required. The great uncertainty, even in the best regulated offices, as to whether reprints will be called for or not, has led in the past to great waste of money on moulds that never will be used. How this difficulty is now overcome is dealt with under (iii).

To the librarian the processes which stand out in their interest are, collotype, for reproductions in tone; replika, where many reproductions of a book or manuscript are required; and photostat, for only one or for a few copies. Two of these processes are well known, but the one here referred to as "replika" is but recently evolved, and is only now beginning to win recognition. Publishers know of it, but most librarians do not.

What has been achieved during the last three years in England (with rapid technical improvement during 1927) is the power of producing by photo-lithography a perfect printing plate, capable of running off sheets of "reprints" at the high speeds of modern machinery. This is now done under book-printing conditions as regards accuracy of imposition and register. Thus, what has been known for over half a century under the name of "Anastatic process" becomes directly applicable to book reprinting. The main factors in this development have been the success of light zinc or aluminium printing plates, replacing the unwieldy lithographic stones formerly in use, and the introduction of accurate machinery employing the rubber blanket for printing.

Difficulties in the way of perfecting the process on an economic basis have had to be overcome at each step, for previously no serious attempt had been made at book printing on lithographic machines, although music and maps have long been so produced. Some of these difficulties had to be referred to the chemists; for example, the provision of suitable inks that would not set-off (even on to inset illustrations printed on coated papers) when sheets came under the binder's press; others traced back, where they must remain, to the visual colour judgment of operators. Thickening or reduction of the

outline of lettering results, moreover, should any slight variation occur in the power of light used for the various exposures, or in the strength of the chemicals in the sensitive emulsions. Nevertheless, it has proved, and is proving, increasingly possible to adjust these factors so that variations in "colour" are eliminated.

Only three firms in this country are seriously undertaking the reprinting of books by such a process, and the reproduction of manuscripts by such methods is quite a new development. Further improvements in results have recently been effected, and so good have been some recent examples of book reproduction that only experts could determine whether they were produced by letterpress or photographically.

(ii) RANGE OF APPLICABILITY: EXAMPLES.

The economy of "Replika," which is a printing process producing sheets ready for folding and binding, begins at 50 or 100 copies, is in its element at 1,000, and answers well up to 3,000 or 4,000, which is the limit of ordinary requirements; whereas "Photostat" is a photographic process which supplies at a low figure one, or a few, single prints on paper, and is in occasional (though uneconomic) use up to fifty copies. The appendices give figures illustrative of the relation between the number of copies required and costs by these processes, and also by collotype, by zincos, and by half-tone blocks.

The examples printed with this article are reproduced by "Replika" on the same paper as the L.A. "Record," thus proving that papers with natural textures can be used. This is one of the advantages of printing from the rubber blanket of an offset machine.

The scope of the new process is great; from incunabula to novels; from manuscripts to Coptic texts; from thermic charts, greatly reduced by photography, to heavily set books of all descriptions. It will indeed reproduce anything except tone, the one point where it falls short of collotype. The two main uses of the process, so far, have been for the commercial reproduction of modern books, and for the careful facsimile multiplication of rare ones, including MSS. Journals and transactions of learned and technical societies have been replaced by it, and charts, drawings, engravings, maps, and music reproduced.

Valuable originals to be photographed can, by courtesy of the Trustees, be transferred to the British Museum Studio, but commercial work is of course, carried out on the reprinters' premises. It is good to supply two copies of a book, when available, so that the better impression of each page can be photographed. Any colour of ink can be matched and used, and virtually any size of original reproduced. That which is preserved, after a book has been reproduced, is a set of films (negatives) of a durable character. These films are then stored and held to the order of the principal so that further reprints can be made at a reduced rate.

Extracting from books presents no difficulties since extracts can be reduced or enlarged photographically to an even type width and arranged to run on consecutively, thus making practicable the collection and issue of writings scattered amongst transactions, journals, and other publications. In one instance known to the writer a special problem had to be faced in the reproduction of tables of astronomical

observations, wherein the illustrations of nebulae had been printed originally by lithography. These illustrations, none too well printed in the available originals, were numerous and interspersed freely throughout the text. They could have been reproduced by no other process, except collotype, but presented little difficulty by the new process and came out well.

Of the examples of "Replika" reproduction printed with this number, three are from famous originals containing fine line engravings or blocks; one is representative of modern tabular work, to illustrate Appendix II; while the manuscript specimen is from a very difficult half page, selected for its historic interest.

(iii) EFFECTS ON BOOK PUBLISHING.

Publishing benefits directly through the new process by reduction of outlay on making moulds, or keeping standing type, of current productions; and because valuable books of which no moulds or plates exist, can now be re-issued at low prices. This applies especially where the cost of re-setting the type would have been prohibitive owing to the presence in the text of (*a*) tabular matter; (*b*) mathematical and other formulæ; (*c*) non-roman types; (*d*) heavy annotation or other expensive composition; (*e*) illustrations amid the text, whether the blocks are available or not. In the classes of books in which the cost of composition is heavy, catalogues take a high place.

Anything that favourably affects the production of the better class of books will interest librarians, so it is worth while to elaborate somewhat how the direct benefits to publishing accrue. The first change is that moulds from book type are not now made unless at least four impressions of a book can be foreseen with confidence. Indeed, it is open to serious question whether the heavy cost of making moulds and stereos is justified under any circumstances, for stereos will only give four or five satisfactory impressions. The cost of moulds of an ordinary book (cr. 8vo., 320 pp.) is £15. Most of the moulds under the old system were never used, but they had to be made, since to distribute the type without doing so involved the risk of recomposition, say £80.

The number of new books (ignoring new editions, translations, and pamphlets), published in the British Islands during 1927 was 8,846. Even if only a third of these books were moulded, at £15 each, and allowing 20 per cent. (a liberal estimate) for the moulds that were, or will be, used, a waste charge of no less than £35,000 was loaded on to the year's book production in this country! Nothing need now be expended until the first edition of a book is nearly sold out. Another unproductive item dispensed with is type rent, for the publisher no longer hesitates to distribute type now that a means of direct reproduction is available.

The new methods also make re-issues of current as well as of old publications more possible by offering size reduction, if desired, thereby reducing paper, binding, and reprinting costs.

Another advantage is that whereas alterations in plates are very difficult and severely limited, for photographic reprinting they can be effected by the simple method of re-setting the required new matter in the same face of type as the original, making careful pulls, and pasting-over on the original before photographing. The cost of

such alterations, even to a dictionary, is almost negligible. The time taken in reproducing an edition is naturally less than by setting the type, *and there are no proofs to read.*

(iv) FACSIMILE REPRODUCTION OF MSS. AND RARE BOOKS.

Only librarians know, in other than a general way, the rare books which they hold and for which there would be a demand in this country and in the United States if they were obtainable in facsimile at low figures. *Shakespeare's Sonnets*, 1609, was issued recently at 5s.; Milton's *Areopagitica*, at 4s. 6d.; and Browne's *Hydriotaphia*, at 9s.; while Mr. Noel Douglas has recently published another volume in his "Replika" series, a facsimile of the priceless British Museum copy of *The Pilgrim's Progress*, at 10s. 6d.

Some of the University and other main libraries have grants for the publishing of reproductions of their texts and rare books. In most circumstances, however, the counsel of a publisher with wide experience in marketing and distributing would be wisely called in when weighing or entering upon such an issue. Pondering this, the writer went recently to one of the principal publishers in London and asked whether he would examine and consider propositions arising in this way. The answer was "Yes." This is evidence that the combination of owner (or custodian) of MS. material, reproducer, and publisher, is now possible, whereby considered and figured plans can be obtained for the issue of replicas of rare books. Comparative costs of reproducing MSS. are shown in Appendix III.

No new process competes with collotype, which reproduces the tone of the background of a manuscript as well as its text, but "Replika" does give a faithful photographic reproduction of every mark, including accidents such as blots. A glance at the illustration of a page of manuscript will make this clear. If shades and tints of background are required as well, collotype must be employed.

The three main difficulties in reproducing manuscripts are discoloration of paper; discoloration or fading of ink; "show-through." In the course of recent examinations, with a photographic expert, of a large number of first editions and manuscripts at the British Museum, not more than two or three were abandoned on the ground of discoloration of either paper or ink. But a number had to be given up because of show-through, or one particular Grenville or Bodleian copy sought, a specially well preserved veteran. This is not to say that show-through cannot be overcome; it can, but at a cost. The finest negatives are used for this work, and all show-through has to be treated out on the back of the negative, or taken out later on the lithographic printing plate. Intensification is, of course, resorted to where required, and very difficult pages are enlarged to twice life-size, treated, and then photographed down again. Show-through is, therefore, the one thing most inimical to economy.

By such means, during the last two years, much has been proved as to what can be done. What remains now is to learn to do it even better, and to apply the new ability. If that unique book, which passes perhaps before your mind's eye as you read these words, were made available in facsimile, the original would be less handled. This, no doubt, was a consideration which weighed with the British

Museum authorities when they gave permission for photographing such a national heirloom as the copy of *The Pilgrim's Progress*.

(v) PAPER.

The examples now given are printed by the "Replika" process on Abbey Mills Greenfield antique laid as ordinarily used for the L.A. "Record." As a generalisation, it may be said that papers normally in use for printing books from type will answer for the photo-litho-offset process here employed, but any close consideration shows that the requirements of the two methods have definite points of divergence, even though they have much in common.

As this quarterly goes to press, specific tests of about forty papers selected from varied sources of supply are being conducted. The indications are, as expected, that the enquiry will have to be pushed home to the source, namely, the papermaker, upon whose judgment, adaptability, and energy so much depends. In these tests the terms of reference are: (a) printing quality; (b) even-sidedness; (c) ink absorbency; (d) opacity.

The first point causes but little difficulty. Leaving out of account papers that fluff or powder (which are even worse for offset work than for letterpress) a bad underside is unacceptable. The reason for this is that care is necessary with the new process to secure even colour throughout, and this can only be obtained with reasonably even-sided papers.

Insufficient absorption of ink disqualifies some papers, and others demand too much substance in order to obtain opacity. If an opaque paper is required in a thin substance, what is termed "brightness" must not be demanded, but rather a cream shade. In this connection the make-up of the ingredients (the "furnish") of a paper has to be carefully thought out, as it is by the blending of the fibres of particular kinds of material that special features are obtained.

Whilst the Americans make a paper which is very suitable for this class of work, having good colour and opacity and a crisp "handle" due to the incorporation of a particular type of wood, it is rather interesting to note that to-day British paper makers, relying for their finer machine-made papers upon rags, esparto, and chemical woods, are by special processes producing papers that will meet all the requirements of the new process.

The question of the durability of paper is rightly receiving more attention just now—the International Institute of Intellectual Co-operation, for example, is collecting and publishing piecemeal in its Bulletin reports on the deterioration of paper—and it is highly desirable that books and manuscripts of permanent interest should be reprinted on paper that will endure.

Our greatest book treasures contain papers "manufactured" before mechanisation set in; men of craft made them by the use of moulds. Hand-made paper still has its users, and it is good to know that a mill near Maidstone is making papers to-day by exactly the same method it was using when it was established in 1810. The factors which make for permanence in paper are the quality of the materials used, the length of the individual fibres and the way in which they are knit together, and chemical purity.

To sum up the position, papers are in existence in plenty which give reasonably good results ; others are now being evolved which promise to be perfectly suitable for the requirements of the new process. They are in two main classes—commercial papers, which bulk similarly to their letterpress correspondents ; and superior papers, delightful to handle, that will stand comparison with those produced by John Tate the younger in Hertfordshire in the time of Wynkyn de Worde. There is good authority for stating that papers can be made to-day to reproduce those used for manuscripts of any date. In fact, librarian, publisher, printer, and papermaker, may now combine to make true replicas of any notable original.

The camera has thus become, in the directions named, and in others which lie outside the scope of this article, a powerful, resourceful, and versatile ally of the printing press.

DISCUSSION.

In opening, the Chairman, MR. B. N. LANGDON-DAVIES (Mr. Noel Douglas), said that England always tolerated and even encouraged pioneers on condition that they took their inventions and discoveries elsewhere. The printers and publishers who had been working at the photographic system of reproducing books and manuscripts had therefore had difficulties, since they were pioneers but by now the trail was blazed. The main advantages of the system to publishers were four. They no longer had to make moulds in doubtful cases ; they could distribute the type and reproduce by photography if required ; standard books which were out of print could be re-published at the original cost since composition was avoided ; the reprints could be of reduced size in the interests of cheapness ; tabular matter and other complicated composition in such reprints cost no more than straightforward work. Librarians had two main advantages : standard books for which there was a steady though not a large demand could be revised, and replicas of first and rare editions could be obtained. The chief questions that arose were whether the results were satisfactory and whether the process was cheap enough.

The discussion, after MR. PARLEY had introduced his paper, proceeded by means of question and answer, in which a great many of those present participated.

APPENDIX I.

BOOK REPRODUCTION : COMPARATIVE COSTS.

Crown 8vo. book. (7 $\frac{3}{8}$ in. by 4 $\frac{7}{8}$ in.). 352 pages. Straightforward composition (such as fiction—1br. per page). Paper, not included.

	No. of copies	...	100				500				1,000				1,500				2,000			
			£	s.	d.	91	8	10	94	16	0	99	0	0	103	4	0*	107	8	0		
1ST IMPRESSION	{	Including composition and machining	LETTERPRESS																			
			REPLIKA																			
	{	Corresponding to composition and machining	LETTERPRESS																			
			REPLIKA																			
Total cost of 1st and 2ND IMPRESSION	{	Including Moulds and Stereos	LETTERPRESS																			
			REPLIKA																			
	{	Allowing reduction of 7d. per page for negatives	LETTERPRESS																			
			REPLIKA																			
Total cost of 1st, 2nd, and 3RD IMPRESSION	{		LETTERPRESS																			
			REPLIKA																			

* From *The Truth about Publishing*, p. 351, by Stanley Unwin (George Allen and Unwin, 1926).

APPENDIX II.

BOOK REPRODUCTION : COMPARATIVE COSTS.

Crown 8vo book. 352 pages. Fairly heavy composition (2 $\frac{1}{4}$ brs. per page), as last illustration. Paper, not included.

1ST IMPRESSION	No of copies	...	100		500		1,000		1,500		2,000	
			£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.
{ Including composition and machining	LETTERPRESS		190	8 10	193	16 0	198	0 0	202	4 0	206	8 0
			44	17 9	48	8 0	52	16 0	57	4 0	61	12 0
{ Corresponding to composition and machining	REPLIKA											

	No. of copies ...				1,000		1,500		2,000	
	LETTERPRESS	REPLIKA	500	1,000	1,500	2,000	500	1,000	1,500	2,000
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Total cost of 1st and 2ND IMPRESSION	255 18 1	79 10 2	262 19 2	271 15 7	280 12 0	289 8 5				
			86 10 8	95 6 8	104 2 8	112 18 8				
Total cost 1st, 2nd, and 3RD IMPRESSION	269 7 5		280 2 4	293 11 2	307 0 0	320 8 10				
	114 2 7		124 13 4	137 17 4	151 1 4	164 5 4				

* Stereos will give about five printings.

APPENDIX III.

COMPARATIVE COSTS OF REPRODUCTIONS OF MANUSCRIPT OF AVERAGE DIFFICULTY.

Figures show cost per 16 pages. Size of page, 10 in. by 6 $\frac{1}{4}$ in.

PROCESS	No. of copies	1	20	50	100	500	1,000
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
COLLOTYPE	...	—	8 16 0	9 1 0	9 12 6	14 5 0	19 15 0
Excluding paper	...	—	—	—	—	—	—
LETTERPRESS*	...	—	—	17 16 6	17 19 11	19 7 3	21 1 6
From line zincos, area 40 sq. in. Including book paper	...	—	—	—	—	—	—
LETTERPRESS	...	—	—	33 3 7	33 8 3	35 5 2	37 10 8
From half tone blocks, area 40 sq. in. Including coated paper	...	—	—	—	—	—	—
PHOTOSTAT	...	1 2 8	9 18 8	21 10 10	—	—	—
Good photographic prints, on paper	...	—	—	—	—	—	—
REPLIKA	...	—	—	5 0 2	5 5 3	6 11	8 4 6
Including slight treatment on 14 pages, and thorough treatment on 2 pages. On paper as shown	...	—	—	—	—	—	—

* Line zincos are only suitable for exceptionally straightforward manuscript.

Certain Aspects of Agricultural Research.

BY DR. E. H. TRIPP,
Chief of Intelligence Division, Nitram Ltd.

The science of agriculture differs from most other sciences in its complexity. It can hardly be regarded as a single science, but is rather the product of the application of many sciences: a body of (more or less) exact knowledge obtained by applying various special sciences to the economic production of plant and animal materials that will serve mainly as food or clothing for man and animals. We realise its complexity when we recall that the sciences at the foundation of agriculture are, primarily, botany, zoology, chemistry, and physics; in the second place the derived sciences, bio-chemistry and physiology, genetics, entomology, protozoology, mycology, bacteriology, phytopathology and parasitology, veterinary science, meteorology, geology, engineering; and to these must be added economics and mathematics.

Owing to this heterogeneity of subject matter, agricultural research is not strictly comparable with research in a special science; in many respects it is more difficult, not only because it demands a wider knowledge, but because it necessitates a different experimental technique. In a laboratory research it is, as a rule, fairly easy to control or eliminate all the subsidiary factors that may possibly condition the occurrence of a phenomenon so that the determining factor may be observed and, if possible, measured. This also applies to water- and sand-culture work in agriculture. In field experiments, however, the factors are not only more numerous, but one at least, climate or weather, is beyond human control; and climate itself is a complex of temperature, amount and distribution of rainfall, humidity of the air, duration and intensity of sunlight, atmospheric pressure and wind. The second ubiquitous fundamental factor, the soil, is also a complex; its composition varies within very wide limits, both qualitatively and quantitatively, in respect of mineral constituents, humus, water, insects, bacteria, protozoa, moulds, and fungi, and often the same field shows disturbing variations in composition. The complexity of agricultural experimentation makes it very difficult to draw general conclusions, and to arrive at any valid generalisation it is necessary that an experiment be replicated at each locality where it is performed, and be repeated under different conditions of soil, climate, etc., in different localities; and the results must be submitted to mathematical analysis in order to ascertain their probable error.

To illustrate these points by two short examples: The investigation of the direct combination of nitrogen and hydrogen to form ammonia is—apart from difficulties in technique—a fairly straightforward problem. Temperature, pressure, and rate of flow of the gases over a given catalyst can be established and measured without great difficulty, and the results observed can be applied to the manufacture of ammonia at any time and at any place. If, however, we are investigating the effect of ammonia (in combination) on plant life, we have to consider the numerous compounds that are available for

this purpose ; that the effect of each will vary with the plant, with the climate, and with the soil ; and that during the course of each experiment, neither the weather, nor perhaps the composition of the soil, will remain constant.

A given type of soil in one part of the world may behave as a medium for plant-growth quite differently from a similar soil in another part. Thus the soils of Sierra Leone are for the most part light and acid ; they are very deficient in potash and in lime, and the acidity is not corrected by liming : yet in spite of these facts they yield very good crops (rice and oil-palms). In England such soils would be of very little value in their natural state. Similarly, the soils of the Gezira, to the south of Khartoum in the Sudan, are so heavy and so alkaline that *a priori* they would be considered worthless ; yet they grow excellent cotton.

Problems like the above necessitate for their solution not only protracted research but attack on a wide front (chemical, physical, biological, etc.) ; and in general it may be said that expert opinion is tending to the view that far better results are attainable by attacking such problems extensively from different angles by a team of workers, than by relying on the unco-ordinated efforts of individuals working in isolation and from single points of view.

The complexity and extremely wide distribution of agricultural research, together with its great and ever-increasing volume, demand not only organised attack, but organised preparatory or intelligence work. Much time, effort, and money may be wasted if the research worker is not sufficiently acquainted with all the work that has been done before. This preparatory work has in the past been done by the research worker himself ; it takes a lot of his time, and it may be very imperfectly done in the absence of adequate library facilities ; or if the research worker is imperfectly acquainted with sources of information ; or if, as frequently happens, he cannot read foreign languages. In the early years of a science the burden of finding out what has been done before is comparatively light, but to-day nearly all the sciences have grown to such an extent that it has become well-nigh essential for some at least of the preparatory intelligence work to fall upon other shoulders. For these reasons the provision of properly qualified intelligence or information departments is becoming more urgent, not only in state or state-aided establishments and large industrial undertakings, but in the scientific departments of universities and other higher educational institutions, and in the interests of solitary research workers.

The collection, collation, classification, recording, and dissemination of preparatory knowledge is obviously best performed where good libraries are available, and, to avoid overlapping and multiplication of effort, the work should be centralised as much as possible. So far as I know there are only two large semi-public institutions of this kind that are available to agricultural research workers in this country, and these are very specialised, *viz.*, the Imperial Bureaux of Entomology and Mycology, which are admitted to be most efficient. The Imperial Agricultural Research Conference, which was held in the autumn of 1927, recommended the establishment of similar bureaux for soil science, animal nutrition, and animal health, to be located at Rothamsted, Aberdeen, and London, respectively ; and it is to be

hoped that these recommendations will be adopted, with the further provision that Rothamsted take within its purview not only soils, but certain other branches of agriculture, such as plant-nutrition and fertilisers, not already provided for.

At the present time the provision of intelligence facilities for agriculture and other sciences is very deficient. A glance at the ASLIB Directory under the heading "Agriculture" shows that the special libraries available to agricultural research workers are widely dispersed and for the most part very small. Unless a worker lives in London or Harpenden, it is almost certain that he will not be able to find all he wants to know about a given subject in a nearby institution. Rothamsted is a notable exception; it possesses the best agricultural library of ancient and modern books in the country and gives information and advice freely and with unfailing courtesy. Nevertheless, it falls short of the ideal; it contains no card-index in any way comparable with that kept by Nobel's at Ardeer (described to ASLIB in 1926); the contents of books are not indexed; and the journals and periodicals may not be circulated. It is suggested that the expenditure of an additional thousand pounds or two a year to develop Rothamsted on the intelligence side would be fully justified. Rothamsted, the centre of agricultural research in the Empire, should become also the Mecca of agricultural research workers for information and expert advice, and provide a hostel for their temporary accommodation.

To those seeking information, London offers a great deal, especially in regard to published literature, and it is particularly valuable to those who require information on borderline subjects, such as engineering and economics. A searcher can nearly always find what he wants in London, but it may take him a long time. There is no one library there that is in any way complete from the agricultural standpoint. The Patent Office Library is probably the best in this respect, but it suffers from the same defects that are common to all the other London libraries where agricultural works are housed: subject-indexing is very incomplete (except in regard to patents), and scientifically qualified assistants are conspicuously absent. In the latter respect the library of the Imperial Institute forms a notable exception. Librarianship is not enough; one must have special knowledge; and every special library and information bureau must command adequate personnel.

The lack of any complete collection of literature in any one branch of agriculture prompts the suggestion that it would be far better if the various libraries were to specialise in one or more branches of the subject, and to leave Rothamsted to aim at completeness. Then the searcher would know exactly where to go instead of, as now, being compelled to visit several libraries on the offchance of finding what he wants at any one of them. Inside the library, in the absence of adequate subject-indexes, the searcher will of necessity turn to the abstract journals, of which there is a plurality, and no one of which is complete; but the "Experiment Station Record" and "Chemical Abstracts"—both American publications—between them will usually suffice to put the searcher on his way. The subject of Abstract Journals is a long one and cannot be discussed here. It may, however, be said that in agricultural abstracts, as in those of most other sciences, there is much overlapping and duplication; there is also a general

need of unification and centralisation, international as well as national. The adoption of an international auxiliary language for abstracts and other scientific literature would in itself save enormously in time and money, and I am convinced that such a project is quite practicable ; but I am also convinced that those apparently ineradicable sentiments, nationalism and sectarianism (both forms of selfishness) will prevent a world-language being realised this side of the next world war, if not of the next Ice Age ; and even the adoption by the world of science of a special auxiliary international language will long be delayed by the inability of scientific men to carry their scientific methods into everyday life.

Having now discussed some aspects of agricultural research that have a direct bearing upon intelligence work, I ask your attention for a few general remarks on the subject of personnel.

The essential function of the intelligence worker is, briefly, to collect and render immediately available knowledge that is required by the research worker. As I have pointed out, in future the functions of " searcher " and " researcher " will become more distinct. The qualifications demanded of them are also in many respects distinct ; accuracy is, of course, vital to both, but the " searcher " need not possess the very high scientific ability that is required in the first-class research man ; and in view of the overloading of learning, the latter needs to be relieved of the burden of acquiring foreign tongues and spending on spade-work time that he could much more profitably devote to his researches.

The intelligence worker, whether he be in the special library or in the information bureau, (*a*) must have a really good command of his own language ; he must have studied the meanings of words and be able to express himself clearly, tersely, and precisely ; (*b*) he must have a real knowledge at least of the principles of the science or sciences about which he has to supply information ; (*c*) he must be able to read fluently at least two foreign languages, of which German should be one, and to translate accurately from them into good English* ; and (*d*) he should be able to grasp quickly the points in a diffuse or nebulous article or thesis.

These, with accuracy, I take to be the most essential qualifications demanded of the intelligence worker, and if in addition he is capable of compiling reports that involve reasoning and the exercise of the critical faculty, his value to his employer will be much greater. There are plenty of intellectual unemployed among us, some of whom, if they are trained scientific men, should find employment in the libraries and information offices of large institutions, academic and commercial. The functions of ASLIB, I suggest, should not begin and end with acting as an indicator of sources of information ; it might well use its influence to promote the efficiency of work done in special libraries and information bureaux by concerning itself with the training and further education of men who desire to, or have already entered, this comparatively new profession ; and by keeping panels of men com-

*Our standard of attainment in foreign languages is very low ; the teaching of German was very foolishly ostracized in many if not in most of our schools during the War ; and generally, in comparison with countries like Holland, Belgium and Germany, our schools fail ignominiously to bring their pupils up to a reasonably high standard.

petent to act as intelligence officers, translators, and abstractors. In all this work it should be made a cardinal point of never recommending a layman for a technical job.

The librarian in a special library, and the technical specialist in an intelligence department, have many interests in common, and one would like to see more co-operation between them. The librarian, particularly if he have special knowledge, should be able to help the intelligence worker in his search for published information, and assist him in appraising its value. The intelligence officer, particularly in a large organisation like a government department or an industrial firm with world-wide connections, will have access to information and sources of information denied to the librarian, and interchange of information between them should be mutually helpful. Such interchange should extend to bibliographies; and in this connection the valuable suggestion made at last year's Conference by Mr. Headicar should not be overlooked, *viz.*, that librarians should try to induce compilers of bibliographies to leave a copy with them. As it would be too much to expect the compiler to make a special copy for this purpose, the library should provide him with a special copying book. Not only in agricultural research, but in all other progressive human activities, the cry is for more co-operation among workers and better co-ordination of their work. By promoting intercourse and mutual help between officials of special libraries and information bureaux, ASLIB is "doing its bit" in a manner that deserves increased recognition and support.

DISCUSSION.

The following written contribution was communicated by DR. JAMES GOODWIN HODGSON, the Librarian of the International Institute of Agriculture at Rome:

"Dr. Tripp has hinted at the importance of looking at agriculture from an international viewpoint. Not only must the more important languages be considered, but much of value appears also in the lesser known languages, which would be lost were it not for an adequate digest or summary of that article in some review in one of the better-known languages. For instance, there was carried out in Russia not long ago a series of experiments on soil classification which has practically resulted in a new basis for this science. Printed in Russian, these studies might never have come to the attention of the rest of the scientific world had not one Ministry of Agriculture had a staff of researchers doing a systematic searching of those out-of-the-way periodicals—out-of-the-way in the English or American sense of course.

"There are three ways of making such material available. Bibliographies, digests, and annual summaries which attempt to cover the important progress in any one field during the year. Dr. Tripp has mentioned some of the bibliographies and digests, but special mention should be made of the 'Agricultural Index,' published by the H. W. Wilson and Company, of New York, and the two cards series, one on tropical agriculture, issued by the Institut Colonial at Marseilles, and the other on general agriculture, issued by the Reichsbund akademisch gebildeter Landwirte, in Berlin.

"To my mind there are two things most needed for the scientific worker in agriculture: (1) A bibliography of literature which would do for the world what the 'Agricultural Index' does for the English-speaking countries, without including so much popular and purely local material; and (2) annual summaries of the progress of different branches of the science, with proper bibliographical references to the most important original articles. The first is the work of the librarian, the second is the function of the specialist himself, and should be attempted only by an outstanding authority.

"Dr. Tripp's mention also of the need of a central library for agriculture in England is quite suggestive. For if Rothamsted, with 20,000 volumes (according to my best figures), is the most important agricultural library in Great Britain, there

is a serious need for a central repository. The size of the problem, of course, can be gathered from an estimate which I have made that there are perhaps a million volumes which can properly take their place in an agricultural library, either as basic material or necessary source material on allied sciences. The two largest agricultural libraries in the world—that of the Department of Agriculture in Washington, D.C., with about 200,000 volumes, and that of the International Institute of Agriculture at Rome, Italy, with about 180,000 volumes—only contain respectively twenty and twenty-five per cent. of a total collection.

“But I think that Dr. Tripp here has struck the keynote of proper co-operation between the various agricultural collections. I should, however, suggest that a union catalogue of the subject be brought together in one of the libraries in London—for example, the Ministry of Agriculture Library—where some beginnings of a clearing house could be established, and where co-operation with the C.L.S. would be easy. Something of Dr. Bradford’s work of putting together a general bibliographical catalogue for the Science Museum might suggest a means. As a matter of fact, before many more years we must expect that the same sort of co-operation in building up union catalogues will be demanded of the agricultural librarians on an international basis, probably with the International Institute of Agriculture as a working centre.

“It might not be amiss to call attention to the work of the International Institute of Agriculture. An organ of state, it has for its main function the collection and distribution of information relating to agriculture. This information may be bibliographical, statistical, or reviews and digests of material published elsewhere. As the heart of any such work, of course, there comes the library, already perhaps the most important in Europe, but at present going through the very painful process of re-organisation, in the hopes that in the end the usefulness of the library to research students in all parts of the world will be greatly improved. Already some start has been made with inter-library loans of material that cannot be found within the country itself, which is a very important function for a central collection such as ours. We have also begun in a small way what we hope will later become a fairly good union catalogue, although we cannot hope to make it as complete as any such an effort carried out on purely national lines.

“As a closing suggestion, I might say that if there is any effort made to have a proper co-operation between the agricultural libraries of Great Britain in working up a central union catalogue, or in any other way of unifying their collections, the International Institute of Agriculture Library at Rome would be glad to try and bring its work into harmony with any plans adopted in England, so that a basis for international co-operation can be wisely laid.”

MISS M. S. ASLIN described the scope and facilities of the library at Rothamsted, which is an outlier library of the Central Library for Students. DR. L. T. THORNE spoke of the great value of the pioneer work of Lawes, Gilbert, and Warrington at Rothamsted. He mentioned the collaboration and consequent prevention of duplicating in abstracting between the Chemical Society and the Society of Chemical Industry. DR. R. S. HUTTON referred to the work done in connection with the commercial side of agriculture by the Empire Marketing Board. He spoke of the difficulty in getting suitable personnel for intelligence work and of the necessity of presenting the results of research work in a way that would appeal to the intended readers. A higher standard of English composition was needed. MR. E. I. ROBSON mentioned as one great difficulty in agricultural research the time that was necessarily occupied in field trials. He referred to the proposals of the Imperial Agricultural Research Conference for the establishment of information bureaux and correspondence centres. Among abstract literature he mentioned the “International Review of Agriculture,” published monthly by the International Institute of Agriculture, Rome. This dealt with tropical agriculture, and published good bibliographies of plant pathology. There was also the *Deutsche Landwirtschaftliche Rundschau*, and “Botanical Abstracts” was also often useful. For agricultural machinery there was the *Archiv des Landmaschinenwesens*.

MR. E. W. HULME, MR. W. SWAINE, and MISS F. MARKS also took part in the discussion.

The Literature of Scientific Management.

By J. FORBES MARSDEN,

Industrial Engineer.

On being asked to prepare a paper on the above subject, one's first thought was to define scientific management.

As Dr. F. W. Taylor is usually considered to be the originator and father of the movement, it would seem logical to use his definition. "Scientific management has for its very foundation the firm conviction that the true interests of the two (*i.e.*, employer and employed) are one and the same; that prosperity for the employer cannot exist through a long term of years unless it is accompanied by prosperity for the employee, and *vice versa*; and that it is possible to give the worker what he most wants—high wages—and the employer what he wants—a low labour cost—for his manufactures."

H. K. Hathaway states: "Scientific management has for its objects the saving of energy, materials, and time, or in other words the elimination of waste, and the increase of the world's wealth resulting from greater productivity of men and machinery."

Louis Brandeis puts it this way: "Scientific management means universal preparedness, the same kind of preparedness that gave Prussia the victory over France, and to Japan victory over Russia. In scientific management nothing is left to chance; all is carefully prepared in advance."

Another way of saying the same thing by Henry L. Gantt:

- "(1) Provide means of utilising all of the available knowledge for the work in hand.
- (2) Provide means for seeing that the knowledge furnished is properly utilised.
- (3) Award liberal compensation for those who use it properly.
- (4) Provide liberal means for acquiring new knowledge by scientific investigation, with adequate rewards for success. In introducing such a system, begin at the bottom and go slow."

One usually looks to Taylor's books as being the foundation upon which all the literature bearing upon this subject has been built; but the writer would like to call attention first to a book written by our fellow-countryman, Charles Babbage, about the year 1832 called "The Economy of Manufacture," in which there is some suggestive matter which might reasonably be called glimmerings of scientific management. Unfortunately, being compelled by force of circumstances to prepare this paper away from all sources of reference, it is hoped that the omission of concrete quotations will be pardoned.

The second item to which attention is directed would seem to indicate that some, at any rate, of the mechanism of scientific management is of far higher antiquity than has hitherto been recognised. Although the records about to be mentioned are hardly literature, they are written records.

The writer is indebted to a wireless talk by Mr. Woolley of the British Museum on the treasures found at Ur of the Chaldees for the hint that there might be something of especial interest worth looking into.

It was found that there had been discovered a number of records dealing with factories run as part of the activities of the great temple. It appears that there was a vast storehouse in which everything for the use of the temple, its priests, priestesses, servants, and employees was kept. Nothing whatever could be obtained from this storehouse except on the presentation of a written requisition in duplicate which stated the exact quantity of and article desired, and the purpose for which it was required. This was dated. Upon presentation the two were signed by the recipient of the goods, by the issuing officer, and by a witness! One was for 60 ga (some liquid measure) of sesame oil for anointing the locks of a priestess, and was dated "in the month so-and-so in the year when the bank of the Canal was repaired." This particular record was made approximately 3500 B.C.! Many others were found of all dates; the most modern one seen was Circa B.C. 550, or about the time of Darius.

Other records were a nominal roll of employees with details of absences (one excuse was "embalming relatives!") also separations which were usually deaths. In a parallel column were given details of the payments which were in the form of rations, the striking feature being that young girls and old women received less than the strong, able-bodied women of middle age; a form, dare we say, of payment by results?

Another very ancient document, but not from the same source, is a six-column balance sheet of approximately 3000-3500 B.C., in which costs are worked out in man-days, which one thought was a very modern conception.

Coming to more modern times the general literature of the subject has increased to such an extent that it is almost impossible to keep pace with more than a fraction of it. Scientific management has extended its ramifications far beyond the factory walls—and even inside them it covers now so much ground, that one is compelled to limit oneself and specialise in that section wherein the individual interest centres. The old proverb about the making of books would appear to apply with especial force in this particular field. One matter for deep regret is the small contribution made by English writers, with a few notable exceptions.

The great bulk emanates from the United States. What may be described as the classics, the books of Taylor and Gilbreth have been translated into nearly every important language. Some recent writings on costs have been produced by Germans, who seem to be much more advanced in the science of costing than are the Americans. The few French books that have come to the writer's notice deal more particularly with physiological and motion studies.

One noticeable feature of the American literature is the tremendous increase during the past five years of books dealing with graphs and charts.

Another notable thing is the lack of anything at all approaching standard terminology, notwithstanding that a very strong committee has been sitting for some years now dealing with this point.

The English student of scientific management should bear in mind when reading American works the difference in conditions. The general run of workers is not so well educated as ours, and quite a fair proportion are unable to express themselves clearly in the Anglo-Saxon tongue. Naturally, the quota system has had its effect; but even so the condition remains. Further, some of the methods employed in earlier days are considered too harsh and have been modified in recent years; reference is particularly made to certain schemes of payment by results. Taylor's own scheme had a definite and special object, the creation of a highly-trained corps of specialists. Hence he penalised those who were unable to reach the somewhat high standard he set.

Scientific management, as shown by the more recent writers, has not only enlarged its scope, but has become much more human. Not very long ago, a psychologist attached to a famous firm accused the industrial engineer of being a mechanician to the neglect of the human element, but this gentleman was probably too much of a specialist to realise how far the present-day practitioner takes this very factor into consideration; knowing full well that without the co-operation of worker, staff, and higher management nothing of any moment can be achieved.

Hunt, in his book on "Scientific Management since Taylor," gives an illuminating instance. As recently as 1924 a sign bearing the words "*Hands* enter here" was removed from the workers' entrance. It is a matter for interesting conjecture as to how many employers in our own country still regard workers as "hands." As a compendium of articles showing the trend of scientific management this book can be commended. But it should be read in conjunction with the Hoover report on "Waste in Industry" and a paper presented to the Royal Statistical Society about 1926 by A. W. Flux, in which American output is compared with British.

Undoubtedly, the classics of the science are Taylor's books: "Shop Management," "Principles of Scientific Management," "The Art of Cutting Metals," "Notes on Belting" and "A Piece-rate System." The last but one is very much neglected, except by the industrial engineer specialising in factory work solely, but is well worth the attention of any manufacturer. Others amongst the earlier writers are H. L. Gantt, Carl Barth, H. K. Hathaway, Thompson, Frank Gilbreth and his wife, Harrington Emerson, Morris L. Cooke, and a few others. Most of these men were closely associated with Taylor and developed his methods into methods of their own. Gantt did good work amongst textile mills, as his book, "Work, Wages, and Profits," well illustrates. Barth is a wonderful mathematician, and his contributions are mainly in cutting metals; his formulæ and slide rules are amazingly ingenious and interesting. Hathaway and Thompson have written about management more generally. Harrington Emerson's great work was on the Santa Fé Railway, and he published a volume dealing with this in particular. It is commended to the attention of all railway directors and their higher executives.

Gilbreth's works are mainly devoted to motion and fatigue study, but there are three of his books which are too little known in England: his "Concrete System," "Bricklaying System," and "Field System."

These will provide much food for thought for all those interested in building and contracting.

Mrs. Gilbreth's "Psychology of Management" reminds one to mention Mrs. Christine Frederick's "Scientific Management in the Home," a book which should be in the hands not only of every housewife, but of every manufacturer of domestic articles.

Morris L. Cooke has devoted much attention to the printing trades.

More recent writers on general aspects of management are Hugo Deiner and Dexter Kimball. Both books are valuable for details and representative forms. The writings of Hamilton Church on management and costs are probably familiar to most of you.

In specific fields, Gilbreth's work on motion study, etc., Dwight Merrick and W. O. Lichner on time study, represent two sides of a controversy which exercises many minds, and will probably continue to do so. Gilbreth's death has removed the most ardent advocate of the former, of which he was the inventor, although it is believed that Mrs. Gilbreth is carrying on the work.

C. E. Knoeppel and G. Shepard have both written books on the actual methods used in installing scientific management, and a useful book by W. Kent on investigating an industry is well worth perusal.

Josephine Goldmark and Gilbreth have both contributed much to fatigue study, and Amar's work deals with physiological bases for fatigue and contains many interesting devices which have been produced for the reduction of fatigue.

In the fields of costs, there appear to be two well-defined schools of thought. The one dealing with this subject from the practical point of view of the industrial administrator, and the other that of the professional accountant and economist. The absence of standard nomenclature makes it difficult for a layman to grasp the true meaning of much that has been written and to distinguish which school any particular writer belongs to. This is especially marked in articles which appear in the public press from time to time. It is a matter for regret, as it prevents the general public from forming a true judgment on many controversial matters.

It is not suggested for one moment that accountants do not exist who are capable of seeing costs from the practical side, as is evidenced by Charter Harrison in his "Cost Accounting to Aid Production" and Jordan and Harris in "Cost Accounting Principles and Practice."

The writer holds, and he believes logically, that accounting applied to the recording of costs is a misnomer; and that they are more truly statistical records and to be dealt with by statistical methods and rules. Rightly used costs are intended to show efficiency in the use of men, money, and materials, and are most decidedly not a system of debits and credits to be dealt with by the methods of double-entry book-keeping. This view is held by many American and some German writers. The accountant economist view is exemplified by Scovell in "Cost Accounting and Burden Application."

There are a few books dealing with the special aspect of purchasing and storage of materials, and many writers give methods of recording the purchase and consumption of raw and semi-finished and finished goods.

Welfare work is a well-known and widely-spread activity, in which we in this country are passing through a stage that was very evident

in America just about the war period. But even in this work ramifications have become so great that it is well nigh impossible to keep pace with its growth. The housing of workers, industrial medicine, etc., all have their specialists. Factory seating and eye fatigue are being investigated at many centres.

If all of this is true of that side of industry, which is more especially the writer's, namely, production, what are we to say about the marketing side and the general administrative and financial? And when to this is added the application of scientific management principles to retail selling, hospital administration, to municipal affairs, to surgery, to agriculture, and so on, no single man can hope to be able to review the literature of so vast a subject.

The Society of Industrial Engineers have found it expedient to publish a bibliography of bibliographies which will enable you to gain some idea of the growth of writings on the subject.

Cannons of the Finsbury Library published some years ago a bibliography which was fairly complete at the time of its compilation and is useful even to-day, but the extent of this literature is simply amazing.

As you have a special interest in sources of information, and at the risk of it being already known to this Association, there are special libraries at the following places :

London School of Economics.

Commercial Library, Royal Exchange, Manchester.

A Commercial Library at Birmingham.

A Commercial Library at Bradford.

There are probably others now ; many firms have also extensive libraries on the subject, one especially at Messrs. Rowntrees at York. The writer also possesses one of about three hundred books, dealing more especially with costs and production.

One must not forget to mention one or two English works. A new one just out on factory organisation, by four specialists connected with Messrs. Rowntree's works ; Oliver Sheldon's "Philosophy of Management ;" Boddington on Statistics, as applied to commerce and industry ; Pilkington's book on time study, are the most outstanding contributions by English writers.

DISCUSSION.

In the unavoidable absence of Mr. Marsden, MAJOR L. URWICK took his place. Major Urwick first dealt at length with the question of a definition of the term "Scientific Management," his only point of serious disagreement with Mr. Marsden. His own definition was "that form of management of any undertaking which makes full use of the intellectual technique, the methods, and the standards evolved by the workers in the physical sciences." Proceeding to the literature of the subject, he said :

I think we must distinguish between those books which deal with the practice of management itself, and those which are a treatise on, an extension of, or an application of one of the underlying sciences on which it is based.

Now in the first category I would, with Mr. Marsden, place the whole of Taylor's own works and most of Gilbreth's. In 1912, C. B. Thompson published a collection of all the articles of importance which had, up to then, been written by the men working with and around Taylor (3). This may be read together with Hunt's "Scientific Management since Taylor" (4), a more recent collection covering the last sixteen years. A third useful collection of extracts, both from books and articles, is "Business Administration," compiled and edited by L. C. Marshall,

the Professor of Business Administration, Chicago University (5). Coupled with the biography of Taylor already referred to, this series of books will give the enquirer a fairly complete view of the general theory of Scientific Management and of such notable applications as have already taken place.

If, after this reading, he wishes to summarise his impressions and to discover the present position of the art of Management viewed as a whole, he might read any one or two or three full-length modern books, such as those of Jones (6), Lansburgh (7), or Whyte (8). If he is engaged in practical Management himself, he should certainly purchase in addition "Management's Handbook," edited by L. P. Alford (9). This is a very expensive little volume (it costs 30s.), but very cheap at the price. It contains over 1,400 pages printed on India paper, and deals in twenty-five or thirty sections with the actual practice of Management in its various branches. It is full of diagrams and tables. It is written in note form, like the Engineer's pocketbook. Personally I keep it constantly by me when dealing with Management questions.

The man who wants to keep pace with the progress of the general Management movement must, of course, concern himself with periodical literature. The most interesting and the best periodical at present published is "The Taylor Society Bulletin." "Factory and Industrial Management" is particularly useful on the production side. An annual subscription of \$3.00 will cover either of these publications. The various publications of the American Management Association (20, Vesey Street, New York) are rather more costly, the foreign subscription being \$30. In addition, however, to issuing a large variety of papers each year describing actual experience in different branches of Management, the Association publishes a monthly "Management Review." This little journal is the best source, in my experience, for reviews of Management books. It has saved me from buying a large amount of useless publications on the strength of an attractive title and table of contents.

Closely allied to the general question of Management, but dealing rather with the higher organisation of businesses which Taylor did not directly touch, is O. Sheldon's "Philosophy of Management" (10). Mr. Sheldon is a colleague of mine, so I had better repeat somebody else's opinion: Dr. Person, the Director of the Taylor Society, told me that he thought Sheldon's book was one of the best things that had been published on Scientific Management since Taylor's death. Undoubtedly the world is waiting for a general re-statement of Taylor's ideas in view of the large amount of experiment which has taken place in the last decade. I have heard rumours that this is on the way under the general guidance of several leading members of the Taylor Society. When it comes, it must, of course, be added to the list.

In the meanwhile H. S. Dennison, H. S. Person, Miss M. P. Follett, and other industrialists and thinkers have been giving a series of lectures to important executives in New York each year for the last five winters. These lectures have been collected and published under various titles, the first two volumes published by Williams and Wilkins Co. (11 and 12) and the later volumes by the A. W. Shaw Co. (13 and 14).

I propose to deal with one only of the special fields which are an extension or application of one of the underlying sciences on which Management is based. The greatest development since Taylor's time has been the increased attention paid to the psychological aspects of work and the whole complex of the worker in the job. In this field very significant work has been done in this country. On the more general side I should like to call the attention of everybody to a little book by my friend John Lee, entitled "Management" (15). Mr. Lee was a personal friend of W. H. R. Rivers, and some of the references to psychology as applied to industrial questions in Rivers' "Psychology and Politics" (16) were the result of discussions with Mr. Lee at the Central London Telegraph Office. This book summarises and expresses more clearly than any other the attitude of the modern manager to the job of controlling others in the light of democratic ideals and scientific thinking.

Mr. B. S. Rowntree's "Human Factor in Business" (17) deals more directly with the material environment of the worker. It is, however, undoubtedly fundamentally scientific in attitude and talks about "our experiments" rather than "our experience."

On the strictly technical side, far the best book is "Personnel Management," Scott and Clothier (18). The description of selection tests, grading systems, and schemes of promotion which this book contains is an eye-opener to many English employers.

On the psychological side, Myers' "Industrial Psychology in Great Britain" (19) is the best modern statement. The admirable "Journal of the National Institute of Industrial Psychology" will keep the student well informed on new developments. He should also look at such publications of the Industrial Fatigue Research Board as bear upon general questions and upon subjects directly within his industrial orbit. "The Personnel Journal," published by Williams and Wilkins Co., may also be recommended.

With the other underlying sciences I do not propose to deal. They are outside my own special field. I should like to draw attention to the enormous expansion of the use of statistical method in solving business problems. More particularly the special application of statistical method known as Graphics is altering the methods of maintaining control in large business enterprises out of all recognition. Allied to this development is the evolution of the new science of business forecasting. Those who wish to study this subject are recommended to read in the first place Mr. W. Wallace's excellent short summary (20).

I should also like to add to Mr. Marsden's list of resources the library of the Management Research Groups at 23, Bloomsbury Square. If any member of the Association would care to consult this library, either I or my assistants will be delighted to give him facilities to do so.

We have found there that the Dewey classification is hopeless as a basis for arranging a Management Library. We have worked out a classification of our own with which we are very dissatisfied. One of the things which is most certainly needed is a satisfactory form of decimal classification for this vast new subject. When the whole world of economic activity suddenly becomes self-conscious and starts to write about itself, the librarian's lot is not a happy one. That is what has happened in the case of Business Management.

At the same time I feel that Mr. Marsden has been too pessimistic. While my sympathy goes out to the unfortunate individuals who have to attempt to classify and arrange the voluminous pamphlet and other literature which is being turned out, it does not extend to those who say that the subject is too complicated for them to understand it. Mr. Marsden leaves the impression that the subject is incorrigibly complicated, that there is a vast field of literature which it is hopeless for the student to attempt. That is not the case. In Management, as in medicine or any other activity, it is impossible for any one student to become master of the detail of all the different fields. But to have a working knowledge of what is meant by Scientific Management, and an understanding of what effective work has been done by Taylor and those who have followed him, is not difficult. I have mentioned in the course of this paper twenty books. I venture to suggest that the man with practical experience of industry who masters the contents of these volumes will have read all that he needs to read for the moment on the subject, regarded as a whole. The technical literature of his own special field he should know already.

It is vitally necessary that a larger proportion of the business world should address itself to the question. Great Britain is falling behind some of the other industrial nations in the attention which she is giving to this particular matter. The future standard of living of her people inevitably depends on the flexibility, knowledge, and the intellectual equipment of those who direct her industries.

BIBLIOGRAPHY.

- | | | |
|---------------------|---|---------------------------------------|
| 1. COPELY, F. B. | "Frederick W. Taylor." | Harper Bros., 1923, 2 vols, £2 2s. |
| 2. HOXIE, R. F. | "Scientific Management and Labour." | D. Appleton and Co., 12s. |
| 3. THOMPSON, C.B. | "Scientific Management." | Harvard Univ. Press, 1918, 25s. |
| 4. HUNT, E. E. | "Scientific Management since Taylor." | McGraw Hill Book Co. Inc., 1927, 15s. |
| 5. MARSHALL, L. C. | "Business Administration." | Univ. of Chicago Press, 1921, 25s. |
| 6. JONES, E. D. | "The Administration of Industrial Enterprises." | Longmans, 1926, 18s. |
| 7. LANSBURGH, R. D. | "Industrial Management." | J. Wiley and Sons Inc., 1927. |
| 8. WHYTE. | "Business Management." | Pitmans, 1927, 25s. |
| 9. ALFORD, L. P. | "Management's Handbook." | Ronald Press, 30s. |

- | | | | |
|-----|-------------------|--|--|
| 10. | SHELDON, O. | "The Philosophy of Management." | Pitmans, 1923, 10s. 6d. |
| 11. | METCALF, H. C. | "Scientific Foundations of Business Administration." | Williams and Wilkins Co., 1926, 18s. 6d. |
| 12. | " | "Linking Science and Industry." | Bailliere, Tindall and Cox, 1925, \$3.50 (16s.). |
| 13. | " | "Business Management as a Profession." | A. W. Shaw Co., 1927, 25s. |
| 14. | " | "The Psychological Foundations of Management." | A. W. Shaw Co., 1927, 25s. |
| 15. | LEE, JOHN. | "Management." | Pitman, 5s. |
| 16. | RIVERS, W. H. R. | "Psychology and Politics." | Kegan Paul, 12s. 6d. |
| 17. | ROWNTREE, B. S. | "The Human Factor in Business." | Longmans, 2s. 6d. |
| 18. | SCOTT, W. D. } | "Personnel Management." | A. W. Shaw Co., 1923. |
| | CLOTHIER, R. C. } | | |
| 19. | MYERS, C. S. | "Industrial Psychology in Great Britain." | Jonathan Cape, 1927, 7s. 6d. |
| 20. | WALLACE, W. | "Business Forecasting." | Pitmans, 1927, 7s. 6d. |

The discussion which followed Major Urwick's address was taken part in by MR. P. K. TURNER, MR. H. ROTTENBURG, MR. ANGUS FLETCHER, MR. H. POTTS, MR. F. E. SANDRY, MR. FOSTER SPROXTON, COUNCILLOR W. H. SMITH, MISS E. M. FORCEY, and MR. F. J. TRITTON.

Existing Types of Indexes to Technical Periodicals.

BY H. H. JOHNSON, A.M.I.Mech.E., A.M.I.E.E.,
Joint Editor, "Engineering."

This title may refer to two distinct types of things—the indexes of their contents which are published at the termination of the various volumes by most technical periodicals ; or the indexes to the technical press generally, or some branch of the technical press, which are compiled and published by various technical or scientific associations. A brief reference may be made to the latter class, although in the main this note is concerned with the former. The value of, and necessity for, general indexes to the technical press are questions that are frequently discussed, but there is nothing novel about compilations of this kind. They have come into existence, and very frequently ceased to exist, over many years, and experience would appear to show that it is not possible to carry on an index of this kind on a self-supporting basis. Without dealing with some of the earlier efforts of this kind, the matter may be sufficiently illustrated by a reference to a publication which came into existence during the war. This was started by the General Staff of the War Office under the name of "The Technical Supplement." It presumably served its purpose at the time, but when, in the late summer of 1919 it ceased to be an official publication, and was taken over as a private venture, it had but a short history. The paper after being taken over was re-named "The Technical Review," and was published fortnightly at a shilling. It was quite a useful compilation, particularly to people who normally have little opportunity of seeing the continental technical papers, but its short career suggested once again that there are not sufficient people prepared to buy a journal of this kind to make it possible to carry it on a paying basis.

There are a fair number of Indexes and compilations of this kind which are subsidised in one way or another. "Science Abstracts," issued by the Institution of Electrical Engineers, in association with various other English and foreign scientific societies, is one of the best known. This deals with physics and electrical engineering. A good publication of the same class dealing purely with engineering matters is "The Engineering Index," published by the American Society of Mechanical Engineers. The Science and Technology Section of the "Subject Index to Periodicals," published by the Library Association, may also be mentioned.

There would be no purpose served by giving a long list of compilations of this kind, but it is important to note that, correctly speaking, none of them is an index at all. They are all rather classified lists of selected parts of the contents of various periodicals ; and one of the first things that will become evident after a study of a selection from the indexes published by the various technical journals is that, for the most part, they also are, correctly speaking, not indexes at all. They are very frequently not even classified lists of subjects—they are little more than alphabetically arranged lists of titles of article.

An index should concern itself with the actual information given on the pages it deals with, and not merely with the title under which that information may happen to appear. To take a very simple case : a technical journal may reproduce the whole, or part, of the address given by the President of the British Association. The address may carry a title of the type chosen by Sir William Bragg the other day—"Craftsmanship and Science." The address may, however, very well contain information on a variety of scientific subjects which are in no way suggested by the title—say, as an example, "Wave Mechanics." Someone perhaps five years hence may be collecting information on this subject, and may reasonably wish to know if anything is to be obtained from the pages of the journal which has reproduced Sir William Bragg's address. If, however, this journal publishes an index at all like those produced by most of its contemporaries, the enquirer will get little assistance from it. He will probably find the address indexed under "Bragg" and "Craftsmanship and Science," and if he is fortunate he may possibly find it under "British Association"—all these entries are, of course, useless for the enquirer after "Wave Mechanics." He may guess that Sir William Bragg may possibly have said something on the subject he is interested in and look up the address, but if he is to guess and to search for himself, he would be as well off without an index at all.

The suggested case of Sir William Bragg's address is a simple one, but in a periodical which covers the subject there is likely to be information on wave mechanics from a variety of sources, some of which the enquirer may quite well never have heard of, and it is the business of an index to give references to all these pieces of information under a common heading. Few of them appear even to try. There are two probable reasons why most technical periodicals are not supplied with more complete indexes : one is the cost of producing them and the other the difficulty that probably frequently arises in finding anyone who is competent to make the index and has the time to do so. Many of the indexes published are clearly compiled by a clerical staff which is quite incompetent for the work. Anyone who makes a proper index must be familiar with the whole of the contents of the volume he is dealing with—any parts he is not familiar with he must read specially for the job. He must know enough about the subjects treated to be able to bring together all information relating to one subject, even if in some cases a particular catch word may not be used at all ; while he must also know the various subjects well enough to be able to supply the suitable alternative headings under which each subject should appear in the index. If an article entitled, say, "Underwater Discharge Apparatus for Torpedoes," is to be indexed, it is not sufficient to enter it under "Underwater," as would appear to be the system in many indexes. It must appear under "Torpedo," "Navy," or "Warfare," depending on the particular reference word used by the index concerned, possibly under the name of some navy using the apparatus and under probably "electric" or "compressed air" and the name of the maker or inventor. All this takes a lot of time—much longer than it took to produce one of the entries of a recent index to a well-known engineering weekly. The title of the article was "Recent Progress in the Methods of City

Refuse Collection and Disposal." This appeared under the word "recent" and nowhere else in the index.

Indexes in general are curiously weak on this question of alternative headings. A leading scientific weekly in a recent index has an entry "Zeiss Planetarium for Rome," but has no entry under "Planetarium Zeiss." This particular example is the less excusable as the index has an independent section dealing with names, so that Zeiss gets in twice. Surely it is evident that in the case Planetarium is the subject and Zeiss more or less incidental. In the same index there is an entry under "Albino Rat," but no "Rat, Albino." This particular index describes itself as a Title Index, but, even confining oneself to titles and neglecting the contents of the articles, there is no difficulty in finding examples which miss the whole point of indexing. The same index contains an entry "Absorption Photometer, A critical, for the Study of the Compton Effect." Here the article has not been indexed strictly under its title, but very properly under the first important word in its title. For proper indexing, however, this article should also be indexed under "Compton Effect," which it is not. Something else in the same index is entered under "Compton Effect," that the other reference could have been given simply by adding another figure.

Many technical periodicals classify their indexes under general headings—indeed, all probably do a certain amount of classification. A good example of the fully-classified index is that published by the well-known French engineering weekly, "Le Génie Civil." This index is divided into sections under such headings as Aéronautique, Automobiles, Chemins de Fer, and so on. The "Engineering News Record," of New York, the "Engineer," and the index to the German "Zeitschrift des Vereines Deutschen Ingenieure" do the same sort of thing to a large extent, but insert their cross-headings into the body of a general index.

The classified index has its advantages—particularly for the compiler—but it is doubtful if the system is suitable for a really complete index, and it is certainly not very convenient to use. The reader has to decide for himself under what heading a subject is likely to be placed. Suppose, for instance, one is looking for information on the subject of ventilation, he might suppose it would form a main heading in a classified index, and all would be plane sailing. A recent index to a well-known engineering paper, however, has no entry under "Ventilation." A little guessing and search finds a ventilation entry under "Tunnels," and one can either be satisfied with that or look under "Municipal Government," "Building Constructions," and perhaps a dozen other of the classified headings of the index to see if they have anything to add. This example illustrates what appears to be a fundamental weakness of the classified index. A properly cross-referenced general index would give the word ventilation if there was anything in the volume concerned dealing with this subject.

Some indexes attempt to give incidental information by means of a system of suffixes added to the page numbers, or by the use of various sizes of type. Thus under each classified heading in the index of "Le Génie Civil" the entries are divided into two groups, the first in larger type. The first group refers to the main articles in the journal, the second to the briefer notes and reviews of foreign technical journals, which are features of the paper. It is difficult to see, however,

that it is of any value to the enquirer to know what particular kind of article, from an editorial point of view, the information appears in. If there is anything in the volume concerning the matter he is interested in he will wish to see it and the only result of the system in this particular case is that the user always has to look in at least two places in the index. The "Engineering News Record" carries this system much further, and indicates the class of article referred to by no less than six different affixes. In this case one of these affixes is an asterisk, which indicates that the article is illustrated. This particular part of the system is employed in "Engineering." It is definitely of value to know from the index whether an article in a technical periodical is illustrated or not, although it is doubtful if it is of any value to know that the article is described by the editor as "editorial" or "news" or what not. The "Engineer" has a special index of illustrated articles; "Engineering" had the same thing for many years, and the fact that it has been discontinued is sufficient evidence that it is considered the space and energy devoted to the illustration index are better spent in increasing the size and completeness of the main index.

Indexes to authors or "names" are quite common and useful, but they should not be relied on too far. They can only be fully used by someone who knows the names of the workers in the subject he is looking up fairly fully, and this he by no means always does. There may frequently be someone of whom the reader has never heard, and whose name he would consequently never look for. If main indexes are relied on too fully they become very inconvenient, and it does not appear that any advantage lies in such an index over the more logical way of entering names as part of the main index.

The average classified index to an engineering periodical has about 2,500 entries. Recent figures are: "Engineering News Record," 2,800 entries; "Engineer," 2,400 entries; "Zeitschrift des Vereines Deutschen Ingenieure," 2,400 entries; "Engineering" has a fully cross-referenced index, of the type described by implication in this paper, containing 6,000 entries.

DISCUSSION.

A great many members took part in the informal discussion opened by MR. JOHNSON. At the end of the meeting the following resolution was passed, on the motion of DR. E. H. TRIPP, seconded by MR. R. L. SHEPPARD: "That the Council of the Association appoint a special committee to investigate and report upon practicable and economic methods of improving the indexes and lists of contents in scientific and technical journals."

Cartography and the Research Worker.

By J. N. L. BAKER, B.Litt., M.A.

The subject of "Cartography and the research worker" may be approached from two quite different points. Whether cartography is regarded as a science or as an art there are opportunities for research work in the making of the map. Some of the possibilities in this direction were indicated by Mr. A. R. Hinks in his presidential address to Section E (Geography) of the British Association in 1925, and those interested should refer to his paper. In calling attention to the new aids to cartography—wireless and the aeroplane—he showed how the problems of the map maker were not thereby automatically solved, and that, in fact, there was still room for work by the mathematician and the instrument maker. Similarly the printer can contribute to the improvement of the "art" of map making.

There is another side to the subject—the use of the map when it is made. Here are two aspects of research open to students of varied interests. First is what may be called "geographical" research, for which, obviously, maps of all kinds are of great value and which in many cases can only begin when the finished map is available. In such work as regional survey, to take an obvious instance, the map not only gives the facts, but quite frequently makes possible their interpretation. It must not be assumed that such a survey begins and ends with the map, but it is true that many aspects of the survey have a diminished value without it. Similar studies will occur to all.

It may not be out of place to refer here to a suggestion made by Mr. Farquharson in his paper on "Civic and Regional Surveys." It is most desirable that local libraries should collect maps of all kinds, from *all* editions and scales of the Ordnance and Geological Surveys relating to the locality to local productions, showing "bus routes and the like. Maps of the present day will be historical documents for future generations, and their careful preservation is a matter of the utmost importance. At the present time students are unaware of the existence of such material or are unable to get access to it in any one place.

In addition to this geographical research, there is also what may be called historical research in cartography, a branch of study in which geographers and historians may profitably co-operate. The pioneer work of Sir George Fordham has not only been of great value in itself, but it has also shown many of the ways in which this side of the subject may be approached. He may justly claim to have put the new subject of carto-bibliography on its feet, but as bibliographies exist for only a quarter of the English counties there is still room for work here. Further, as he has shown, something more than bibliography is possible. A close connection exists between the study of early maps and the interpretation of history, and the increasing number of reproductions of early maps is throwing this branch of study open to a wider circle of students. Political and economic history are illuminated by maps showing early routes or those drawn for military purposes, while without the contemporary map a great deal of the history of discovery and colonisation has little meaning. The recent decision of the Privy Council in the Labrador Boundary dispute, in which the interpretation of the map was a matter of the greatest moment, or the publication of "A Book of Old Maps, delineating American History from the earliest days down to the close of the Revolutionary War," illustrate in slightly different ways the importance of this aspect of cartographical research.

It is not very likely that many outstanding discoveries will now be made in this subject, though a few like that of M. C. de la Ronciere, are possible (see "Geographical Journal," LXV, 247). But there is still room for a great deal of valuable and original work on individual maps. Little is yet known about the methods of their compilation, and only a few scholars have studied a small number of them in detail. As instances of the kind of work possible reference may be made to the study of an early sixteenth century map by Miss E. G. R. Taylor (see "Geographical Journal," LXXI, 474) and to Mr. Whitehouse's paper on "Representation of populous centres and populated areas" (see "Geographical Teacher," XIII, 90). These examples are mentioned not so much because it is suggested that they should be followed by other similar studies, but because they help to emphasise the point that cartography is a large subject and still offers a wide field for the research worker.

DISCUSSION.

The following took part: COLONEL E. L. JOHNSON, MISS M. FLOWER, MR. L. C. WHARTON, MR. H. M. VAUGHAN, and MR. A. R. BARNES.

The Librarian as Archivist.

By HILARY JENKINSON.

The subject of archive science has almost ceased to be a stranger in the librarian's syllabus of studies. For quite a number of years, for example, it has figured in that of the Library Association, and it has been a regular feature in the summer school organised by Dr. Ballinger at Aberystwyth. Most important, perhaps, because most formal, was the recognition given to it when it was included in the syllabus of the new School of Librarianship started nine years ago at University College, London. It has continued to be a necessary part of the training in that school, and every year from twenty to forty students, destined, many of them, to take positions in the public libraries of the country, have dedicated thirty or forty hours of lecture, and much more of private work, to the study of this subject in combination with palæography. Moreover, the School of Librarianship has been responsible for the appearance of what was, good or bad, the first attempt made anywhere at a complete *Manual of Archive Administration*,* a book written largely to meet the needs of the class there. I hope, since I happen to have been the teacher charged with the duty of organizing this study at University College, I may be forgiven if I regard this approach of a new type of student to a new subject as a matter of some interest; and if I take the opportunity (finding myself in a gathering of distinguished librarians) to set out for information, and perhaps criticism, my own view of the reason why archive science is a subject proper for the attention of English librarians, and of the lines along which it should be studied.

Archives—if I may begin with a definition—are the pieces of writing, on whatever material made and in whatever form (whether originals received or drafts prepared for despatch or memoranda of transactions), which business men and business offices, public or private, have tended everywhere to accumulate and preserve by way of reminder and summary of various aspects of the work of which they formed a part; and during the last century or two it has become recognised that the masses of archives which have survived to us after their original purpose had long ceased to be of any importance form a mine of information as to the doings of the past not only quite independent of the narrative accounts, more or less contemporary and more or less prejudiced, which had hitherto formed the basis of our histories, but actually superior to them very often in wealth of detail and always in authenticity and impartiality. So much have archives gained in estimation that there is almost a danger lest the use of those derived from the past, and the preservation of those which are being piled up in the present by an age of card-indexes and duplicators, should alike be overdone. That, however, is a point we need not labour here: what interests us is the fact that there is in our time no subject of serious research which may not—which

* Clarendon Press, 1922.

does not, frequently—turn to them for its illustration. Just as there is no human activity or interest which does not, sooner or later, become involved in the machinery of the world's business, so there is none which may not be found figuring in archives of one kind or another, often in the most unexpected places: the best specimens of early English wallpapers and of eighteenth-century patterns of dress materials (to take two recently-noted examples) are among the public records. And since the librarian is the servant of research the subject of archives, at least from a bibliographical point of view, of their whereabouts and availability, of the means of approach to them and of the books in which they are made public, has become an essential part of his stock-in-trade.

But it is not because other people studying archives may require his intelligent assistance that I have ventured to suggest for the librarian the role of archivist. That word, as I see it, is properly applied not to the research-worker who takes from archives what interests him or helps his work, but to the man who, armed with the necessary special knowledge, undertakes the task of preserving them and of producing them when required—of doing for them, in fact, what the librarian does for his books. It was with the object of training young librarians for this task that the archives course at University College was planned; and the questions I wish to try and answer in this paper are, first, why should the English librarian be asked to undertake this extra labour? and, second, why and how is the training necessary for the keeping of MSS. which are archives different from that required for the keeping of other MSS. or of books?

To answer the first of these questions involves a brief survey of the official position of archives in England. In most countries the State recognises and controls, at least in theory, the archives produced by all grades of public administration, from the central Ministry down to the least important hamlet: generally the central and controlling authority is that which has the actual care of the most important central collections.* In England we have no such system. The Public Record Office Acts of 1838 to 1898 and the Order in Council of 1852 give to the Master of the Rolls control over all legal records within the direct jurisdiction of the High Court and, with some modification, over the accruing archives of existing public departments; but with only one exception (to be mentioned presently), although various Acts† have from time to time recognised an obligation upon this or that local authority to make and preserve records, no attempt has been made to face, by way of statute, the problem of enabling and enforcing their preservation under proper conditions. This being so, it need hardly be said that there has been no statutory attempt to deal with the question of the preservation of the archives of semi-public bodies or of private persons or institutions, though the Historical MSS. Commission, in the 150 odd volumes it has published since 1870, has done valuable work by calling attention to their existence and importance.

* Thus in France it is the *Archives Nationales*, the institution which looks after the archives of most of the great departments of State, past and present, which is the head of the whole Archive Administration of the country.

† A notable example is the Local Government Act of 1894.

It is in respect chiefly of the classes of private archives, though to some extent also of those of a semi-public nature,* that some of us who are interested in the possibilities of documents have endeavoured to invoke the aid of the librarian. It is hardly necessary to emphasise here the value of the documents or the magnitude of the peril—they have been made the subject of denunciation or appeal for many years at numerous conferences of the learned, and only last year the Congress of Archæological Societies devoted the larger part of its annual meeting to the subject—but I permit myself one example of what may occur: Since the passing of Lord Cairns' Act, some fifty years ago, made the preservation of the older title deeds to land no longer a practical necessity it is literally true that hundreds of thousands of such deeds, many of priceless value for local history, have been destroyed or scattered. One could give countless detailed illustration of the effect of uncontrolled ignorance, combined with a little cupidity and a good deal of apathy, upon what should have been a recognised national inheritance.

It may be asked—why pick out the librarian for the part of *deus ex machina*? Frankly, the answer is that one takes the best one can get. Local interest in local history, which so often does (as it always should) find a natural ally in the local librarian, is the strongest motive force for the safeguarding of documents: but the fundamental question, as experience has shown again and again, is that of repository space. 'You want me,' says the owner, 'to refrain from selling my family papers; but have you any place in which, if I offered to deposit them for public use, they could be securely and permanently bestowed?' And inevitably, though we know the difficulty it too has to face in this connection, we turn to the local library.

One more word about the position of the local library as an archive repository. I spoke earlier of an exception to the rule that this country knows no central control over local archives. Lord Birkenhead's Act of 1922 seemed to many scholars as fatal potentially to the Court Rolls—the records of that wonderful system of local jurisdiction which was such a remarkable feature of medieval England and so strong an influence in moulding the growth of later local institutions—as fatal to them as was Lord Cairns' Act to the Deeds; and on this occasion timely agitation produced an amending measure by which the Master of the Rolls, the head of the Public Records, is given power to prevent the destruction and dissipation of Court Rolls and under certain circumstances to order their deposit in local repositories to be approved by him. The administration of these powers is a delicate and difficult task, and the Master of the Rolls, with a committee which he has appointed, has been engaged so far principally in encouraging the discovery and listing of these records—for at present everyone is in the dark as to the number and extent of existing accumulations—and in finding and approving local repositories both suitable for and willing to take local deposits when these may offer. Of about fifty repositories so approved up to date two-thirds are libraries—a sufficient evidence of the way in which this newest of archive problems is

* For instance, those of schools and charities and of commercial firms or public committees, such as those formed during the Great War, which have ceased to function.

touching the librarian : and as some indication of its extent I will venture to quote in conclusion the case of my own county, Surrey. Here we have just had issued by the County Council, in collaboration with the Record Society,* as complete a list as we could make of Surrey Court Rolls ; and though this county, owing to its semi-suburban position, will probably prove to be one of the poorest in such survivals we have been able to list rolls from over 200 manors, twelve collections dating from the thirteenth century and twenty-four more from the fourteenth. Of three Surrey repositories so far approved two are libraries—the Minet Library at Camberwell and Croydon.

So far we have suggested that the local library is, by force of circumstances, not only the natural centre for information about local archives, but often also their custodian. Numerous examples might be given—from large libraries, such as those of Birmingham, Cardiff, and Croydon, downwards—where such work has already been taken in hand, but space forbids. I turn to the question—what should be the special training given to a young librarian in view of these facts ?

The principal classes of topics which may be the subject of his instruction are, I think, three. First there is the *physical care* of documents, embracing the question of the conditions under which paper, parchment, ink, and other writing materials may best be conserved, questions of binding and receptacles, the problem of suitable buildings and fittings, problems of protection from fire, vermin, and other enemies. Next we have the *moral defence* of archives, including all problems attendant on the archivist's task of making his archives available for students and the problem (if he feels called upon to face it ; I do not myself think he should) of selecting what is worth preserving. Finally, there are the studies required by the archivist in so far as he finds it necessary to read his archives for the purpose of *arranging, listing, and perhaps publishing*.

In regard to the first and second of these groups, but particularly the first, the librarian should not have much to learn, for he should have studied, or be studying, in connection with his more ordinary duties the questions of library architecture, the atmospherics of the library, the qualities of binding and parcelling materials, and the natures of paper, parchment, ink, and so forth ; and similarly he should be acquainted with all the received views as to 'production' from repository, the supervision of students, and the like questions. It might be thought that in addition to his ordinary training the librarian would require little here save a few demonstrations of the special requirements of some unfamiliar forms of material or make-up, such as parchment rolls or seals. That is, with one exception, true : apart from a few trifling specialities there is only one thing, one piece of knowledge which the librarian lacks or should lack. But that one is a principle which governs so strictly (if I am right) and so universally the whole of archive work—make-up, repair, labelling, listing, supervision and production, publication—that it is necessary to emphasize and enforce it by illustration or demonstration of its application in every department.

The piece of knowledge about which I have made so much ado is nothing more than the fact that whereas the ordinary collection of

* Surrey Record Society.

books (or of any other objects—the MSS., for instance, in the British Museum) is the result of selection by persons interested in the object which that collection serves to-day, the individual pieces having no other necessary relation than the fact that they were all chosen for the same reason, a group of archives is a single organism which has not been made but has grown, for reasons and under circumstances quite independent of the interests which now make use of it. This is responsible for every particularity which one has to prescribe in the treatment of archives : it is responsible (for example) for the extreme importance attaching to the question of custody, an unblemished reputation in this respect being, it cannot too often be repeated, the *differentia* between an archive and a plain document : it is responsible for a like preciseness as to the place or connection in which an archive was first found ; two copies of the *London Gazette*, for example, which to the librarian are two copies of the *London Gazette*, taking on for the archivist totally different values and characters because one is (shall we say) an enclosure to Foreign Office correspondence, while the other is merely part of the office miscellanea of the Admiralty. One might multiply examples of the way in which this archive character, which consists in the relation of every piece to the administrative machinery which produced it, governs or should govern every action of the archivist's official life ; but space once more forbids. May I merely say in conclusion, deliberately, that there is in my opinion no item in all the dismal catalogue of errors and crimes in the past treatment of archives in this and other countries by their appointed custodians which was not the result of ignorance or neglect of this fundamental fact ?

There remains the question of the necessary acquirements for an archivist-librarian in the matters of palæography and other preliminaries to reading ; they may be stated briefly. He will need in the first place a trifle more of the outlines of English History than generally remains after an average education ; a trifle of the History of Law, especially that of real property, if (as they almost certainly will in a collection of any size) his documents are to include deeds ; some Latin if (once more) the collection is of any size or age, and if it is a medieval one some French as well ; not to mention some idea of the medieval modifications of those languages, though this is not so severe a task as it sounds ; a specially good bibliographical knowledge of the authorities upon Family History and Topography ; and a more detailed acquaintance with those relating to his own neighbourhood ; a familiarity with the actual Scripts employed in the period and variety of documents with which he is concerned ; and some knowledge of Administrative History.

The last two—Palæography and Administrative History—raise a point of some difficulty. The necessity of Palæography of a kind is obvious ; and elsewhere* I have endeavoured to show that the necessity for Administrative History, if less obvious, is really greater ; though indeed it should not require much proof that to understand documents which formed part of a business process one must understand the process which produced them. The trouble is that, while one is anxious to restrict the studies of the aspiring archivist to the

* *Palæography and the Study of Court Hand* : Cambridge, 1915.

period and variety of document with which he will have to deal, one cannot in practice make him a reliable reader without giving him a knowledge of the earlier forms out of which those belonging to his period were evolved ; nor can he practice upon earlier documents without knowing something of the administration which lies behind them also. In a modified form the same difficulty attaches also to the other preliminary studies we have named ; he may not, for example, find Latin in his own documents, but may need it for the reading of earlier ones, the study of which seems essential for understanding the scripts of his own period. The case is one where it is very difficult to prescribe. Perhaps the best we can do is to lay it down, as a rough guide, that if the documents to be dealt with are not earlier than the eighteenth century they may, at a pinch, be tackled without preliminary palæographical work ; that the reading of sixteenth—and seventeenth—century hands ought to be based on a knowledge of those of the fifteenth ; and that for earlier hands than this last one really requires to begin *ab ovo*—say from Domesday. With this we may couple a hope that the student will make his studies as thorough as possible and an assurance that he cannot have too much practice and that he will not find the subject dull.

It may be useful if I end this paper with some description of the effect upon the student, so far as I have been able to observe it, of such training as we were able to give under the circumstances, and on the lines, I have mentioned. Our students were of the London University Matriculation standard, and they were expected to pass, at the end of a year's course, an examination which fell into two parts, one of Archive Science and one of the reading, explaining, and annotating of documents, including transcription from 'unseen' facsimiles of medieval manuscripts. Most of them succeeded in reaching a forty per cent. pass in both. To attain this I found that they needed no more than five or six lectures and demonstrations, with the corresponding amount of private work, on Archive Science ; all the rest of the time (more than two terms' work out of three) being given to reading practice, elementary Palæography, and what I have called Administrative History. The students at the end of this training were not, of course, experienced archivists ; but they had a good idea of their own ignorance and of the means of correcting it. They gave quite a definite impression that they found the subject, or subjects, interesting, and I was certainly very sorry when I had to give up the pleasant task of teaching them.

DISCUSSION.

The short time available was devoted to questions and answers. Amongst the points which arose was a suggestion that steps be taken, though the Incorporated Law Society or some other appropriate body, to call the attention of solicitors to the importance of preventing the destruction or dispersal of deeds and other documents of historical interest.

Vocational Guidance and Selection.

By F. M. EARLE.

Generations come and go; the conditions of human life change from age to age; hence, while the problems of social life remain fundamentally the same, fresh methods of solving them are constantly required. The successful absorption of the young people of each generation into the current industrial and social organisation requires something more than traditional or "rule of thumb" methods. One characteristic feature of the present age is the widespread application of the principles of scientific method to the study of problems of all kinds, and in the special problems of vocational choice there is a fruitful field for their extensive use.

Vocational problems are of two main kinds—those of Vocational Guidance and those of Vocational Selection. Vocational Guidance has been defined as "the giving of information, experience, and advice in relation to choosing a career, preparing for it, entering it, and progressing in it." Accordingly, it covers the activities of a great many persons, including parents, teachers, employment officers, and even employers. But whatever social service be included under this comprehensive term the emphasis should be placed upon the needs of the individual. Administration—as in applying the provisions of the Education (Choice of Employment) Act—is not concerned with individuals as such; yet the principal aim of Vocational Guidance is the welfare of the individual as affected by his choice of an occupation and all cognate matters. This implies a careful study of the individual as well as of industrial and social conditions; only so can the essentially *personal* aspects of the problem be fully appreciated.

In choosing a career the young person embarks upon what may be likened to a voyage of discovery. He may, however, be so ill-equipped for the voyage, he may venture forth on a vessel—his store of experience—so ill-found, or he may aim at reaching such an impossible destination, that there is little or no chance of his ever arriving at any place where he may live happily and prosperously. It is the function of the vocational adviser—parent, teacher, or friend—to guide the young hopeful as to both his choice of destination and his necessary equipment. It may also be well to consider whether his powers of body, mind and character are equal to the trials and dangers of the journey; this, above all else, demands a psychological study of the individual.

Vocational Selection, on the other hand, exhibits a psychological study of the individual from another point of view. An employer is not concerned with the welfare of his employees except to the extent that their physical and mental well-being makes them more valuable servants. Hence, so long as the individual is capable of rendering him satisfactory and efficient service, the employer is not interested in the individual's particular problem, *viz.*, whether his work is that for which he is really best fitted. But the employer is interested in seeing that the workers in each of the departments of his factory or

office are capable of doing the work they are called upon to do. He may add to their usefulness by providing them with suitable working conditions, up-to-date machinery and apparatus, by giving them special training and instruction, and so on, but unless he obtains persons of appropriate abilities to begin with a good deal of time and money will be wasted. Hence the employer must ensure that the persons to whom he offers training and employment must be suitable ones.

Suitability depends, however, on a number of factors—some peculiar to the individual, since they are largely inborn, others the product of the common experiences to which we are all more or less subject. The employer himself may prefer to arrange all the special training needed for his work, or he may expect the schools—primary, secondary, and technical—to send him persons already fully equipped for the work he wants them to do. But in both cases he must make sure that the persons he decides to employ are capable of becoming efficient workpeople. This obviously requires a psychological study of the individual—not, perhaps, of such comprehensive scope as in the case of Vocational Guidance, but nevertheless a precise and exact one. This is the aim of the vocational “tests” which are now being successfully used by many employers in the selection of their staff.

Thus, both Vocational Selection and Vocational Guidance depend upon a careful and comprehensive study of the individual, and, in so far as this study is a psychological one, the methods are often similar. But in other respects the problems to be solved in the two cases are essentially different; in one it is the “man for the job,” in the other it is the “job for the man.”

Vocational Selection, as based upon a psychological analysis of the requirements of occupations, is of comparatively recent origin. We have had competitive methods of selection in some occupations—the Civil Service, for example—for many years. The underlying assumption in such cases has been that the possession of knowledge of certain kinds—mathematics, foreign languages, etc.—is an indication of abilities useful in the occupation in question. In other words the man who surpasses his fellows in acquired knowledge at the age of 16, 18, or 21 is one who is most likely to surpass them in his capacity to carry out the duties of a given post. But this is true only to a limited extent and only in certain occupations; such methods of selection are therefore not invariably successful. On the whole, while it is true that a person of intelligence will generally make a fairly successful attempt at occupations which depend mainly on mental processes, he cannot be expected to do equally well when special abilities are needed. Some of these special abilities involve traits of temperament and character, others include bodily skills and dexterities, and it is often the case that a person of only moderate intellectual power possesses the appropriate temperament or the aptitude for acquiring manual and bodily dexterities by which he is enabled to surpass his more intellectually gifted competitors.

Employers, finding that the unselected products of the elementary schools include a large number of apparently untrainable young people (relative to the efficiency they desire to obtain), have begun to demand a Standard VI or VII school-leaving certificate as a guarantee of the

minimum of knowledge and ability needed for their work. But even if they succeed in securing applicants thus qualified, it is probable that they are defeating their own object by selecting on an intellectual basis those whose duties will be mainly practical. The only satisfactory way to select an employee is, first, to make a suitable analysis of the requirements of the occupation, including those posts to which promotion is possible, and next, to examine the applicants by tests capable of discovering those most apt for duties of the kind required. It may, however, be difficult to decide what the most essential aptitudes are in cases where the existing organisation of the factory necessitates transference from one department to another, or where it is desirable to promote to executive posts invariably from amongst the rank and file. But when departments are large it would seem most advantageous to select workpeople according to their suitability for the work itself and to choose executive officers from different sources and by different methods.

The rapid increase in the number of large factories within the last twenty years—especially in America—has seen the development of a new science of factory management and organisation, and one of the most interesting features of present day development is the increasing tendency for large employers to recruit their workpeople and executive officers much more carefully and scientifically than in the past. In this country several firms have appointed as staff managers persons trained in the psychological and scientific study of occupational problems who are systematically applying modern principles of selection to the peculiar problems of the firm. Others again employ the National Institute of Industrial Psychology to introduce improved methods of staff selection, and the accumulated experience of the last six or seven years encourages a strong belief in the successful development of this work in the future.

But from a social point of view, as well as from the standpoint of the individual, Vocational Guidance supplies the more important group of problems. Society benefits only indirectly from the increased efficiency of the employee brought about by better methods of selection. On the other hand, the community shares directly in the greater happiness of the individual brought about by wise vocational advice. The vocational adviser, like the teacher, the minister of religion, and other social workers, seeks to help individuals to achieve a fuller measure of self-realisation. There are, it is clear, very few human beings capable of securing a well-balanced mental and spiritual development without assistance from the school and the church in the first place, and from an organised social life in the second. From this point of view Vocational Guidance is one of the services offered by the community to its immature and inexperienced members, and, in the end, the community, as well as the individual, benefits from it.

No two people face the commencement of their occupational life with quite the same combination of abilities, temperament, experience, knowledge, tastes, and ambitions; hence what may prove to be a highly absorbing and successful career for one of them may be entirely unsuitable and distasteful to the other. This we attribute to differences in psychological "make up" or "constitution"—the "personal equation" of the individual, in other words. But to recognise its

existence is not to measure it and the problems of vocational guidance are essentially problems of measurement.

The fact of individual differences has been apparent, one would imagine, to the parents of every generation; at any rate, the innate origin of such differences has been repeatedly affirmed. But while recognising the importance of inborn aptitude in relation to occupational fitness the influences of the environment cannot be overlooked. Hence to offer advice upon the choice of a career we need to study each person carefully and in detail. We need to know all there is to know about his abilities, achievements, interests, and ambitions. We rarely succeed in obtaining the whole of this information—for a limit must be set to our enquiries and human patience is not inexhaustible—but we can obtain, if we wish, sufficient to justify the offer of vocational advice. The principal sources of this information are the child, the teacher, the parents, and friends, including medical officers, welfare supervisors, and others with whom the child comes into contact.

The child himself is the most important source of information, because, even if he is too young to express any opinion of his own abilities, direct evidence may be gained by asking him to perform a number of specially devised tasks by which his abilities and knowledge may be judged. Some estimate of his temperament and character may be gained at the same time by observing his behaviour during these activities. Hence the tasks should be set and observed by a person trained in their use and interpretation.

A satisfactory study of the individual therefore includes enquiries into:

- (a) His temperamental and character traits;
- (b) His hobbies, interests, and ambitions;
- (c) His general intelligence, special abilities, tastes, and skills;
- (d) His present knowledge and past achievements;
- (e) His health and physique;
- (f) The requirements of the occupations it seems desirable for him to consider.

The nature and extent of these enquiries naturally vary from stage to stage. The child of eleven is not to be studied in quite the same way as the child of thirteen or fifteen. The vocational guidance of the university graduate of twenty-one depends, *inter alia*, upon a consideration of the effects of his university life upon his career, and it may be that some of these effects may constitute a hindrance rather than a help to his vocational success. Yet the child of eleven or thirteen may become a university graduate, and it is therefore essential that the vocational problems should be seen, even at the earlier stages, in their relation to what they may become at more advanced stages.

The methods of study to be adopted are those of any other science, *viz.*, the patient collection of all relevant facts and the formulation of a hypothesis consistent with them. In the case of vocational guidance this hypothesis is a guess as to the suitability of the individual for one occupation rather than another; the accuracy of the guess is determined, like the accuracy of all hypotheses, by the relevance of the information upon which it is based and by the care with which this information has been collected.

The use of "psychological tests" in vocational guidance comes chiefly from the need for distinguishing between the aptitudes and

the attainments of the individual, for although the knowledge and skill of the individual at any moment reflects the combined effect of his aptitude and the training he has received it does not give a satisfactory forecast of his future development unless the nature and extent of the training already given is known and the progress of the individual under it can be satisfactorily ascertained. Many tests have been devised for the special purpose of measuring abilities, both general and special, and they are proving extremely helpful in vocational guidance.

Abilities are best regarded as complex combinations of a number of separately observable qualities derived from three main groups—those relating to character, to intellect, and to physique. Such traits as sociability, co-operativeness, assertiveness, initiative, and the like are often vocationally important, for they enter into the composition of such abilities as are sometimes called “social,” “executive,” and the like. On the other hand, abilities such as “linguistic,” “mathematical,” and “scientific” are mainly intellectual in origin, whereas “practical” abilities, of which some bodily dexterity or manipulative skill may be an important component, relate more particularly to the physical constitution of the individual.

It is clear, then, that Vocational Guidance, to be effective, must take cognisance of all the component factors in any complex ability and must give to each its appropriate weight; recognising, however, that it may be possible to secure roughly equivalent results by more than one combination. Already the psychologist has given us the necessary technique of measurement, while the progress that has been made recently in analysing the abilities needed for success in different tasks warrants the belief that the guess of the vocational adviser may now become as reliable and dependable as any other hypothesis founded upon a conscientious study of the relevant facts. With such methods of advising the vocational work of the teacher and of the employment officer will indeed become the valuable social service which it is intended to be.

DISCUSSION.

MR. POTTS, in opening the discussion, said that his own interest in Vocational Selection came through the problems which had to be dealt with by University Appointments Boards. He considered the method of personal interview was unsound, as it relied too much upon personality. He mentioned the tremendous amount of work that was being done in Germany in regard to vocational selection. Although it was increasing in England, much still remained to be done.

MR. WEST said that he had been recently interviewing candidates for a clerical post. He had selected a certain number after an interview, asked them to come again, when he gave them a small examination consisting of what he thought were reasonable and simple questions, with, for the most part, very unsatisfactory results; but he discovered that the ones he found most successful in the interviews were least successful in the examination. He would be very interested to know Mr. Earle's method of selecting clerks.

MR. TURNER said that vocational selection in connection with his own work was most important, and it would be very useful to know if there was much literature on the subject, and also whether there was any attempt to give practical assistance in the selection of candidates of high standing.

MISS LAWRENCE gave an account of her recent experience in selecting a candidate for a secretarial post. She first made up her mind as to the exact qualifications she desired, and applied for suitable women to various employment agencies, which sent her candidates diametrically opposite to her stated requirements. After applying to one of the Headmistresses' Associations she selected a certain number of candidates and gave them an intelligence test of her own, which she described.

It was a test that might not have met with the approval of the National Institute of Industrial Psychology, but it was designed to cover the work that would be demanded from a successful candidate, and it had enabled her to select someone who had filled the post admirably.

Miss Lawrence said she wished to emphasise the importance of finding out what work children were suited for and whether their education led up to that work. It was necessary to make them realise that they could go outside the traditional employment of their class and to help them to break through the narrow environment of their lives.

MR. LEACH said his work was entirely amongst University graduates and in dealing with them he thought there was no need for the employer to go to the psychologist for help in selecting a man. He thought it would be useful if employers would exactly describe the job they wished to have filled; he would then collect reports on various students, giving full details of their school and college records, and send these with his own personal report to the employer, who could then judge whether any of these were likely to be the right sort of man.

DR. ROSENHAIN said that he very often had to select research workers, and would feel very doubtful of the utility of any test. He thought one would be just as likely to be misled by a test as one would by a personal interview. There were many people who would be at their worst at any such examination and others at their worst at a personal interview. His method was that after selecting about twenty out of perhaps one hundred, he wrote for their personal references, and from these would select half a dozen for an interview. He considered that personal judgment of a man, together with his record, was the only way of dealing with cases of high intelligence, but with lower grades the matter was of more difficulty. Environment, education, etc., would bring out various qualities. After all, he considered, the main thing was to get a really keen man. To get satisfactory work you must have the real enthusiast.

MR. J. W. BROWN considered that intelligence tests on children at eleven or fourteen years of age were very premature, and that it was not fair to decide a child's future at that early date; it was to condemn it before its capacities were fully developed. He suggested it would be better to vary the education and continue it to a later age, when the child had a chance of forming its taste and developing itself to the fullest.

MR. MACLAGEN and MR. ROTTENBURG also contributed to the discussion.

MR. EARLE, in reply, pointed out that the National Institute of Industrial Psychology never relied on tests alone, but considered the interview a very important factor. In vocational guidance the attempt was to get a series of pictures of the individual from the earliest stages. Some sort of test was necessary for the elementary school boy or girl where it would not be necessary for an honours degree student, though even in these cases they would use their special checks. There was a great deal of research work still to be done, and it had up to now been confined to the boy and girl of fourteen, as that was the age they had to leave school and start work. The Institute realised, of course, that there must be changes in character and outlook, and were now trying to make tests at eleven, thirteen, or fourteen, and if the child went to a continuation school then also at fifteen and sixteen. He concluded by saying that the function of a test was that it gave one the individual standard quite apart from the reports, school doings, etc., though these, of course, were also taken into account.

The Unification of the Library Resources of London

By ARUNDELL ESDAILE,
Secretary of the British Museum.

This is a subject on which a very great deal has been said, written, and thought during the last two or three years, and one, moreover, to which ASLIB has itself made, by the survey of the field in its "Directory," one of the most important contributions; while its conference of last year included a very valuable paper on the subject, by Mr. F. Seymour Smith, to which I shall often refer. Nevertheless, it seems to me probable that members of ASLIB are not so familiar with the problems raised as are the members of the Library Association, and that some resumé of the present position will not be out of place.

The libraries of London at present fall into two classes, practically useless to each other, if not quite as unaware of each other's existence as they recently were; and in each class the individual component libraries are also largely isolated. The two classes are: (1) the Public Libraries properly so called, *i.e.*, the Reference and Central Lending Libraries maintained by the Metropolitan Boroughs; and (2) libraries belonging to and maintained for the members or staffs of private or semi-private institutions, including University and Government Department libraries.

Probably everyone present knows the Report of the Departmental Committee on Public Libraries, published in 1927. If they do, they will remember that that Committee's expressed policy was to make no demand on public funds that would certainly be refused, and to call for no dragooning of backward public authorities so as to bring them into line with the better. Their method was to analyse the practice of the better authorities, and by exhibiting them to convert the others. "We needs must love the highest when we see it," said (in effect) the Committee. It is a beautiful faith, but one of uncertain validity when applied to Borough Councils.

Consistently with this policy of peaceful persuasion, they confined their recommendations as to the public library service of London to the establishment of a voluntary Joint Advisory Board, such as had been already proposed by the Library Association in 1925, and to the free interloan of books from the libraries by the aid of a Union Catalogue, the practical methods of working which were outlined by Mr. Seymour Smith in the paper referred to.

This section of the Report (V b. iii, par. 439) was the only one on which the Committee were not unanimous. The late Mr. Frank Pacy, Westminster City Librarian and Hon. Secretary of the Library Association, entered a spirited reservation upon it (Report, pp. 215-16). He declared that "co-operation is non-existent, and is foreign to the spirit of the present library authorities." He might have added, to that of some of their officers also; since in more than one Metropolitan Borough Reference Library (if I am to believe applicants for reading tickets at the British Museum) there is no copy of the new edition of Rye's "Student's Guide to the Libraries of London."

Some failures in library service are, no doubt, due to mere starvation, and are to be laid at the door of the Councils and their ratepayers ; but not this, which can mean nothing but an insular and incompetent librarian. Mr. Pacy denied, on the grounds of experience, that the pressure of public opinion would move backward authorities, as the Committee trusted, or that "the education of the adult should, any more than that of the child, be left to the sole authority and whim of small units of government."

He accordingly proposed a single (preferably *ad hoc*) authority, which should co-opt members from the University and from important scientific and art institutions, levying a uniform rate over the whole London area. This authority should divide its area into six or eight districts, and establish in each a system of a central library with branches and delivery stations. Each district system would then be comparable with that of a large provincial city, with the added advantage of being linked to the other systems in the area, with which it would practice inter-lending, made effective by being based on a Union Catalogue, and also by a division of special branches of knowledge or literature among the districts.

Mr. Seymour Smith, in the paper referred to, gives striking concrete examples of the difficulties a student may experience in London in obtaining access to a book which is in fact available and close at hand ; and there is no doubt that the citizen of Manchester or Glasgow is better off than the Londoner. The origin and explanation of London's comparative poverty in this and in some other publicly controlled services is just this, of course. While practically all our provincial cities are single units, at least in that the chief town has entirely absorbed the satellite villages, and have but one civic administration, London has so swollen as to embrace without entirely absorbing a large number of villages, which had become populous boroughs, with their own vestries, and retained their corporate sense of individuality, when the London County Council came into existence.

So it comes about that London has twenty-eight library authorities, with incomes ranging from £18,977 to £1,721, with the product of a penny rate ranging from £32,536 to £1,412 (of these only three being over £10,000 and only thirteen over £5,000), and with book stocks ranging from 205,586 to 14,293.

The more one studies Table LXIII appended to the Government Committee's Report, that devoted to London Borough Libraries, the more one is struck by the extravagant variations in the service rendered and in the cost of it.

Now let us regard the whole as one area :

Population.	Income.	Stock (ref.)	Per caput.	
			Stock.	Expenditure.
LONDON :				
c. 4,440,000	£267,104	c. 626,000	1 bk. to 7	About 1s. 2d.
MANCHESTER :				
730,307	£70,257	242,005	1 bk. to 3	A little under 2s.
LIVERPOOL :				
802,940	£60,725	203,780	1 bk. to 4	About 1s. 6d.

Thus, though London has six times the population of Manchester, its expenditure on books is less than four times as great, and its reference libraries have only two and a half times the number of volumes, while it must be remembered that this last figure greatly

flatters London, since to a very large extent its twenty-eight reference libraries repeat the same stock, and the actual number of separate works contained in them may well therefore be only a quarter of those of which the citizen of Manchester can dispose, besides being often out of the individual's reach as well as hard to trace.

Mr. Pacy's statement that London lacks the commercial technical libraries to be found in large provincial cities is not quite accurate, since London possesses a superlative technical library, that of the Patent Office, and a great scientific library which supports it at many points, that of the Science Museum; while that hospital institution, the London School of Economics Library, though not public, does some—more, indeed, than could rightly be expected—of the work of a commercial library.

But his statement that London needs reference libraries of 100,000 books upwards is one which I can support from experience. It is my daily task to weigh applications for admission to the British Museum Reading Room, and, remembering that the Room is over full and not elastic, to shepherd the applicants where possible into another library, a task in which Rye and the "ASLIB Directory" are my enchiridia.

"The toad beneath the harrow knows

Exactly where each pin-point goes,"

sings the poet, and similarly I know exactly for what subjects it is vain to refer a reader elsewhere, and by inference in what subjects the London reference libraries (municipal and other) are weak. Classics, foreign literature, and geography are among them.

A London borough librarian has expressed the opinion to me that when once a student has gone beyond the resources of the normal borough reference library, as it is to-day, he will want nothing short of the Museum. I cannot perceive the cogency of this reasoning. Are there no intermediate stages in study, which many students will not pass? And in any case, even if we assume that any student will need to see in the Museum some books or periodicals not to be found elsewhere, these will not be the chief of his diet, nor should he need to use the Museum for commoner books. It is not very creditable that anyone, past the most elementary standard, who needs to read French books, should have to come to the chief library of research for the purpose.

By the adoption of Mr. Pacy's proposal we should have building up half a dozen reference libraries of approximately the size of those of Manchester or Liverpool, each with a speciality as well as a general collection, while the lending systems would also be, though not so largely, improved.

For convenience I would leave in each borough a small quick-reference collection, and, in order not to lose local interest and enthusiasm, I would leave the local collections where they are.

Could the authorities but see their way to it, and put local insularity and jealousy behind them, a possible method, less drastic than an *ad hoc* body, would be for the authorities in a district of London to set up a Joint Libraries Committee to control the district's libraries and to work with its neighbours.

Will they? At present I fear not, lest the delicate bloom be brushed from their autonomy. Meanwhile their constituents, or those of

them who are students, suffer. *Plectuntur Achivi*, and not the less if for the most part they endure without revolt ills which they take to be incurable.

Our task must clearly be to show the public, in whose hands the power ultimately lies, that they are suffering, and without any necessity, but merely from the mistaken local pride of their representatives. This can only be done by constant public repetition, in the press and elsewhere.

Meanwhile there is a small wheel which might be set in motion. That is the Union Catalogue outlined by Mr. Seymour Smith. In his admirably practical paper Mr. Smith showed exactly how such a catalogue could be made, and what service it would render. He showed how by marking current lists the Union Catalogue could be kept up to date with ridiculously little expense or trouble at the contributing libraries. The retrospective part of the work would be the difficulty, not only there but at the centre. However largely the reference stocks of the twenty-eight boroughs repeat themselves, there can hardly be fewer than 75,000 separate works represented among the 626,000, and not much could be saved on this figure by selection.

There is no question that the right centre for the Union Catalogue would be the Central Library for students, which already has one in embryo, of the collections of the "outlier" libraries which use it as a medium for mutual lending and for lending to the public libraries. All that is lacking is the necessary money for a staff large enough to conduct the Union Catalogue of London Libraries. I am not sure whether this was included in the budget drawn up by the Librarian, Colonel Luxmoore Newcombe, on which the Departmental Committee based its recommendation to the Government to grant for the work of the Central Library and allied work an annual sum of £12,000, but I believe it was.

The Government have, as is probably known to most members of ASLIB, so far not implemented this recommendation, but have delayed definite refusal by referring it to the Royal Commission on Museums.

But even if the Government makes the annual provision for the work at the centre, that will not avail to induce the local authorities to co-operate in it. No part of the grant would be available for the production of duplicate catalogue cards in the Borough Libraries.

Now I am well aware that the suggestion I am going to make is extremely crude and obvious. But I think it is sound. It is to appeal to the Carnegie Trustees to give the start, and for that I do not think that we need necessarily wait for the Government support of the Central Library.

The system of "outlier" libraries is a creation of the Trustees. They made grants to various societies and institutions, either for filling up gaps in their collections of books or for binding, or for cataloguing, on condition that they made the bulk of their libraries available for loan to students through the Central Library. (Any "outlier" can, of course, always reserve rare or valuable or frequently-needed books.) Having begun to do this, they have found it useful to be able to borrow from each other in the same way; and in consequence other libraries have voluntarily come into the circle.

Might not the process be repeated with the London Public Libraries ? A few, of which one or two are in London, have come in as outliers. All honour and credit to the intelligence of their authorities. But in most cases their offer to lend is confined to their collections of local history and topography ; nor do more than one or two (such as Portsmouth) contribute to the Union Catalogue.

Can we but induce the rest to experiment with this mild piece of co-operation, they will, I think, find that nothing is lost, and much gained by carrying their vision beyond their borough boundaries.

The Carnegie Trust's settled policy is to assist beneficent activities during the pioneer stage, and this certainly appears to come within that limitation. For though the Borough Libraries are no longer experimental and, since the removal of the penny rate limit, have more or less adequate public funds to draw upon, the proposed co-operation is experimental. The Trust has now shaken off its shoulders the last of the long series of grants for library buildings, and also the initial grants for the county libraries. Is there anything to prevent it from simply continuing in the sphere of the London Metropolitan Borough Libraries the series of outlier grants it made in recent years to learned societies ? These grants might be calculated to cover the cost of production of duplicate cards for the Union Catalogue. But I think that they would be better devoted to the improvement of the collections, the production of the cards being treated as the borough's *quid pro quo*.

It may safely be predicted that when Chief Librarians have reported to their Committees the advantages actually received from the power to borrow books from elsewhere, and the economy of not needing to buy expensive books possessed by their neighbours, these Committees will find that the humiliation and loss of autonomy are not so dreadful ; they will learn by experience, exactly as did the learned societies, and they will freely further the Union Catalogue and all the forms of co-operation it implies, as do Croydon, Brighton, Portsmouth, and the other enlightened pioneer Town Councils. The step from co-operation to union would then become a natural process.

But just at first I am sure that some outside stimulus, and the removal of the element of initial cost, is necessary. And, as I doubt whether the L.C.C. has any fund which it could devote to this purpose, I am reduced to recommending the old device of sitting on the Carnegie Trust's doorstep.

When we turn from the municipal libraries to others the case is not so simple. But Rye and "The ASLIB Directory" can help us.

It is clear that the libraries of societies, being supported by the subscriptions of members, and a part of the attractions which keep up the necessary roll of membership, must be conducted primarily for the benefit of the members. The methods of unification to which we can look must therefore be voluntary, and of a nature at least not to detract from the utility to members of their own books.

It may be observed at once that the first-rate student, the real researcher, in need of books or journals, is never the difficulty. Though societies will not say so publicly, their doors are always open to him, and their librarians will always take him to their bosoms. The problem is made by the vastly more numerous class of those whose investigations do not at once strike librarians as being of much public

value. Let us take three types, whom every librarian will recognise as among the most common and persistent applicants, and at sight the least useful. I mean the "free-lance journalist," the film writer or producer, and the professional advertiser. These people are, it is true, often very ignorant, but there are among them enormous variations in knowledge and usefulness, and we shall not be wise to treat even the worst illiberally. They all—even the advertiser—disseminate information in the public mind, and if they are debarred from access to exact knowledge, that will not silence them; the only result will be that they will circulate fictions.

How, then, are they to be served? At present the public libraries are not large enough, and there is not room for them all in the British Museum, though the classes I have specified are fairly freely admitted there, in the absence of anywhere else to send them.

We may look for a considerable extension of the system of outliers to the Central Library for Students as the advantages of it become more widely known; and as experiences accrue it is likely that more societies will contribute to that library's Union Catalogue. There are, however, one or two other ways in which private and semi-private institutions could improve their libraries and make them more widely useful both to their own members and to the outer world.

In looking through, still more in using, Rye and "The ASLIB Directory," one is struck by the multiplication of societies covering the same, or very nearly the same, ground, and each maintaining what appears to be a hopelessly inadequate library, and also certainly not employing an adequate librarian. You need go no farther into the alphabet than the word "accountancy" for an example of this; but there are plenty more examples later on.

Now some twenty years ago the medical societies were in the same position of complete isolation, and their libraries likewise. The great achievement of the late Sir John MacAlister was to bring them together into the Royal Society of Medicine, to the enormous gain in efficiency of all of them.

I will not now dwell on the relevance of this argument to organisations of librarians.

Short of amalgamation, why should allied societies not enter into an arrangement by which their libraries should be either united in one, or at least put under the single control of a real librarian, so that each is a distinct branch, covering a distinct part of the subject, with, of course, free interloan and a complete copy of the catalogue of all at each centre? Unification of the libraries would probably lead on insensibly to unification of the societies themselves.

A further move suggests itself. No society has anything in common with all the rest; there are certain natural classes. Thus the Linnean Society and the Society of Antiquaries have no occasion, one presumes, to borrow each other's books. But societies similar yet different enough to need the distinct existence they enjoy—let us say the Optical and Royal Astronomical Societies—may frequently do so.

If there is any long delay in developing the Central Library's Union Catalogue, which is the real solution, could not all the societies serving the natural sciences build up a Union Catalogue of their own, at the Royal Society, and all the humanist societies a similar catalogue under the care of the British Academy?

But I believe that the union catalogue is not more important than the union librarian, if I may call him so. A recent rapid survey of the librarians of institutes, societies, and Government Departments revealed the fact that only in a few are there any real librarians. The collections are often important, the men in charge of them often distinguished. But as librarians they are amateurs, since they have had neither a formal training, nor the practical training which only work in a highly-organised library can give; nor are more than a very few of them members of the Library Association. Under their direction the spade work is done by clerks. Now the amalgamation, or, short of that, the alliance of the libraries of several closely similar societies would allow for the employment of a properly-equipped library staff, and this would be in itself a reform worth making.

I have said nothing of the libraries of Government Offices, nor of those of the University and its constituent colleges. The former are primarily intended for staff use; but if the library of the Ministry of Agriculture receives private students, there is no reason why those of other Ministries should not. And they, too, would benefit by the Union Catalogue and by seeing that their librarians acquire the recognised qualifications of the library profession, as much as do the solicitors or architects in the public service.

The University and College Libraries already have a co-operative system of their own, and are in close touch with the Central Library for Students. I have only one suggestion to make. At the beginning of every vacation we receive at the Museum a stream of applications from the undergraduates of other Universities, mostly Oxford and Cambridge, for admission to the Reading Room, in order to do normal undergraduate vacation reading, for which the London Borough Libraries provide no material whatsoever, and these young students are accordingly admitted, though often under 21 and not doing anything that could be called research. They have no claim on the University of London, but the University and College libraries are the only alternatives to the Museum. I have no outline scheme in my head; but I commend to the Joint Standing Committee of the Association of University Teachers, or to the University and Research Libraries of the Library Association, which I believe may soon be formed, the problem of providing for the vacation reading of students of other Universities who live in London.

I have, as you see, no complete, logical, and rounded system to put before you, but merely, *more Anglorum*, a number of practical steps which may enable us to put into early currency London's wealth of books, now scattered and difficult of access. It is well worth doing. When it is done we shall be unable to understand why it was not done before.

DISCUSSION.

The Chairman, LIEUT.-COLONEL NEWCOMBE, reported that, arising out of Mr. Seymour Smith's paper last year, a joint committee had been appointed by the London and Home Counties Branch of the Library Association and the Association of Assistant Librarians to enquire into the practicability of compiling a Union Catalogue of the London Borough Libraries. In reply to enquiries sent to the librarians of thirty-seven libraries (including the Guildhall Library and the Minet Library) twenty-seven had replied that they were prepared to give the work their active support and nine had stated that the whole of their share of the work would

be undertaken by their own staffs. He also pointed out that the budget on which the Departmental Committee on Public Libraries based their recommendation as to a grant to the Central Library for Students did not allow for the compilation of a Union Catalogue of the London Libraries. It was estimated that this work would cost £1,000 a year for five years.

Points raised during the discussion included a statement that a central depository was necessary to house the large number of rarely-wanted books in the London Borough Libraries. If such a depository could be established valuable shelf space would be set free for more urgently wanted books, and at the same time a copy of the older books would always be available when required. It was also suggested that the problem of the vacation reading of students of other universities who live in London might be met by the Library of the University of London. Mr. HEADICAR pointed out, in reference to the statement in Mr. Esdaile's paper, that the Library of the London School of Economics is always available for students from any university.

In reference to the proposed Union Catalogue of the London Borough Libraries, the appended resolution was adopted, on the motion of DR. BAKER, seconded by MR. BERWICK SAYERS: "That the attention of the Carnegie United Kingdom Trustees be called to the desirability of compiling at an early date a Union Catalogue of London Borough Libraries and the Guildhall Library as recommended by the Departmental Committee on Public Libraries, and that the Trustees be asked to consider the financing of such a catalogue at an estimated total cost of £1,000 a year for five years."

Scientific Abstracting.

By DR. W. ROSENHAIN, F.R.S.

The volume of scientific and technical literature published throughout the world at the present time is so large that it is obviously impossible for any individual worker to read all the publications which relate even to his own particular branch of activity, much less to keep abreast of general scientific progress by direct reading. Scientific abstracting is intended to overcome this difficulty as far as possible, and the many excellent abstracting services which exist at the present time have already proved themselves of inestimable value to the busy technical and scientific worker. At the same time, they still leave much to be desired from a variety of points of view. While it is my purpose in the present note to point out the defects and difficulties attached to existing systems of abstracting, I should not like to be regarded as unappreciative or ungrateful towards the many fine services already rendered.

In view of the admitted impossibility of reading all that is published on his subject, the individual worker is obliged to confine himself, more or less, to two forms of reading. On the one hand he should endeavour to read in full detail all the most important papers relating to his own subject and, perhaps, a few of the most important relating to other more or less cognate subjects. In addition it is necessary for him to keep himself informed, at all events to an approximate extent, of the progress which is being made in his subject generally. In order to aid him in carrying out such a programme, however limited, an extensive abstracting service becomes essential. If it is to meet his requirements, it must provide at least two distinct features. The first of these is a complete index to the scientific publications dealing with his subject. The second is a guide to the most important papers or publications which have appeared in his field. A third feature should consist, ideally, of some method of saving the reader the loss of valuable time and possibly the formation of misleading views by the elimination of the useless and less valuable publications. Let us look more closely at the way in which these three requirements can perhaps be met.

The present systems of abstracting, where they are sufficiently complete, serve the purpose of a general index to publications upon a given scientific or technical subject. The efficiency with which they perform this service depends not only upon the completeness of the abstracts in regard to covering all publications on the subject, but also upon the accuracy and intelligence of classification. In this connection, the liberal use of cross references is to be advocated, since it avoids the necessity, when looking for papers on any particular subject, of looking down the list in several categories. On the other hand, the majority of abstracts as at present prepared and published are much too lengthy and elaborate for the purposes of a mere index. The purpose of an index would be served adequately by a simple statement of the title of the paper, the usual references to authors, publication,

etc., and a very brief statement, never exceeding two or three lines of print, of the contents of the paper. For this purpose no attempt should be made to state the results arrived at, views put forward, or any technical matter of that sort. In this respect these index abstracts would be very much briefer and less costly than the numerous and sometimes voluminous abstracts now published. They would not, of course, serve the same purpose, but they would serve as a definite index to all publications on the subject.

In connection with such an index, however, I would suggest the application of a system of classification or gradation which should to some extent serve the purposes of the "filter" system suggested above. If, for example, papers and publications were divided into three great classes, say A, B, and C according to the importance and general value of the papers in question, it would then be possible to classify them in this way, say, by differences of type or by actual marking with the index letters A, B, and C, or in some similar manner, so that the reader could immediately concentrate his attention upon the papers of the highest importance and interest. It is, of course, obvious that any such classification must be to some extent arbitrary, since it can only be based upon the individual judgment of some more or less competent person or group of persons. It is readily admitted that such judgment may be and in some cases certainly will be wrong. At the same time, in the great majority of cases such a judgment will be readily arrived at, and if the instruction is given that in all cases of doubt the higher classification should be adopted serious injustice is unlikely to occur. In any event, it must be remembered that such a classification in the index system contemplated would be regarded as entirely preliminary or provisional. Those expertly concerned with a particular subject would, no doubt, find it necessary and desirable to read even the papers of Class C or at any rate to examine them, so that a valuable publication accidentally or erroneously classified under C would be rescued in that way. Something further in relation to the question of what may be termed critical or discriminating abstracting will be said below.

The second abstracting requirement suggested above—namely, that of a "guide" to the most important papers—presents points of much greater difficulty than the production of an index. It requires abstracts of, on the whole, rather greater length than those at present published in scientific and technical abstracts in general, and it requires, moreover, that these abstracts should be written with a full and critical appreciation of the work which is being described. To provide a service of this kind in an adequate manner is obviously a difficult and costly business. It requires in the first place an editorial staff of higher competency, broad outlook, and good literary ability, while it demands a larger number of highly-competent abstracters whose critical treatment of papers would be of value to readers of the subject. While much of the present abstracting is extremely well done, it is usually done with a complete avoidance of anything like a critical attitude. The statements, claims, and theories contained in a paper are reproduced in brief, with as little latitude as possible for the writer of the abstract. Under the system here suggested, on the other hand, the reverse would be the case. Consequently the work of the abstractors would become more difficult and would require a higher

degree of literary skill and scientific competence. Proportionately much higher rates of payment would also be required. This, however, is a matter of organisation and, ultimately, of systematic collaboration between all the various Societies, Institutions, and other bodies who at present spend considerable sums upon abstracting work, which frequently overlaps. It is suggested that the value of such a service as is here indicated would be so great to the members of scientific and technical Societies and Institutions that the funds for carrying it on should surely become available.

It may be mentioned that a certain amount of work of this kind is already carried out by a few technical journals both in this country and abroad. In connection with my own special subject (scientific metallurgy) certain of the German publications, and especially the French "*Revue de Metallurgie*," print lengthy abstracts, frequently well illustrated, and occasionally definitely critical in tone. These are of very real value, sometimes even to the author of the paper which has been abstracted, by showing him the precise facts which have been appreciated and those which have been missed by the competent readers who have been employed in preparing these review abstracts. In this country critical reviewing of this kind is generally confined to books, although some attempt to expand it to cover periodical literature, scientific journals, etc., has been made—for example, in "*The Metallurgist*" supplement to the "*Engineer*"—which regularly publishes review abstracts, particularly of foreign papers, of the type here suggested.

If it were possible to contemplate and to carry out in full such a system of abstracting as is here suggested, the review abstracts should, desirably, cover most, if not all, of the papers in Class A of the index. Papers of Class B would be sufficiently covered by abstracts of the length and nature which are now frequently published, while with regard to papers of Class C reference in the index alone should be sufficient. Under such a system, the reader of the abstract would not have to wade through masses of practically useless matter in order to discover which papers were of importance from his point of view. In subjects other than those with which he is immediately concerned the reading of the review abstracts of papers of Class A would be sufficient to keep him abreast of progress on the subject. On the other hand, if he desired to inform himself of all that had been published on a given subject it would be easy for him to utilise the index and to read as many of the papers referred to therein as he thought necessary.

The policy of discriminating and critical abstracting which is here advocated offers important advantages. These extend considerably further than the saving of time of the reader, although that is in itself a highly desirable feature. The indiscriminate method of abstracting which is now generally in vogue brings with it a number of disadvantages, perhaps the most serious of which is the undue importance which is frequently attached, as a consequence of such abstracting, to papers of very moderate or low value. Setting aside the type of publication which is of a summarising or descriptive nature and does not pretend to record original work, there is a wide range of "original" publications which differ greatly in the order of value which is to be attached to them. If these differences are ignored, as they are systematically ignored in present-day abstracting, references

to papers of very moderate value pass into the literature and frequently the names of their authors are quoted along with, or even in preference to the names of those who have really done sound original work on the subject, a result which can only be regarded as exceedingly undesirable from every point of view. Among the types of papers which at present frequently receive undue attention at the hands of abstracters we may mention the following :

- (1) What may be termed immature papers, being frequently the work of research students who have had little or no previous experience in research, and who are often obliged to work with inadequate apparatus and in a very limited time. Such papers may contain valuable data and sometimes describe methods which are of interest and importance for more accurate and systematic work. On the other hand, such papers frequently advance views which cannot be regarded as well founded, and state conclusions upon an inadequate basis of experiment. When such papers are quoted on an equality with, and sometimes in opposition to, the results of systematic researches carried on by experienced workers in well-equipped laboratories with ample time at their disposal, there can be no doubt that real harm is done, unless the reader is given an indication of the relative importance of the work in the two cases.
- (2) Somewhat similar considerations apply to the papers often written by much more competent men, but based upon experimental work done under difficulties or with inadequate supplies of equipment, means, and time. One can point to a whole series of well-known metallurgical papers describing work carried out in this manner. These were abstracted in the ordinary way and have been widely quoted and used in the literature. Later accurate work, however, has shown—what was pointed out by critics at an early date—that the results could not be relied upon. In some instances these papers bore the names of highly-competent men of science, but the apparatus used and the methods adopted were altogether too crude and primitive for the purpose in view. Here again a more critical or discriminating method of abstracting would probably have saved a large amount of misconception and delay in the progress of the subject.
- (3) Finally, there is another class of scientific publication which is frequently abstracted in a manner liable to be misleading to the reader. These are papers which may be described as of the “repetition” type. For example, a system of alloys is investigated, and, as the result of lengthy and elaborate researches carried out with great care and accuracy and with ample experimental means, an equilibrium diagram is established. Some months later from another laboratory, frequently in another country, comes a paper on the same alloy system. The work in this case is often carried out with far less care and accuracy than that of the first investigator, but, thanks to the results already achieved by the earlier workers, the “repetition” worker is able to interpret his observations as confirmatory of those already embodied in the published equilibrium diagram. The paper is then put forward as a “confirmation” of the original work, and it has happened on more than one occasion that a paper of this kind

has subsequently been referred to not merely on a par with the work of the original investigator, but by itself as representing the fundamental work on the subject. Misrepresentations of this kind, which are most frequent where differences of language and nationality are involved, are very difficult to rectify at a later stage, and not only is serious injustice done to the workers who have carried out the real fundamental work on the subject, but it sometimes happens that the validity of the work is questioned because subsequent perusal of the "repetition" paper leads a critical reader to see that the data are insufficient to establish what is claimed.

While it is not pretended that indexing and the more extensive and critical abstracting of important papers will remedy all the evils referred to above, it is suggested that considerable assistance will be given to readers in forming their own judgments upon matters of this kind. It may surely be expected that authors of subsequent papers will hesitate to give references only to papers of classes B or C.

If some such system of indexing and abstracting, coupled with classification, as has been suggested above, is regarded as desirable, the question arises whether it can feasibly be carried out. Fundamentally this is a matter of finance. A very strong, well-organised abstracting bureau would be required, and the maintenance of this bureau could only be achieved by the financial co-operation of all the societies, institutions, and other bodies interested in the various subjects. A board of highly-competent editors, whose names would command the confidence of the readers of the abstracts, would be required to undertake the duty of classification of the papers and the selection of those to be treated by means of review abstracts. The preparation of the review abstracts themselves would require the work of men of considerable competence and status. If possible such review abstracts should be signed with the names of the abstracter and, subject to the supervision of the board of editors, the review abstracters should be given a fairly free hand. For the preparation of the index, on the other hand, no very highly skilled labour would be required. The abstracts of papers of Class B, however, would require the collaboration of a number of abstracters of the type now engaged upon work of this kind.

Coupled with the problem of the production of such abstracts is that of their publication. At present a certain number of bodies and publications undertake the systematic publication of abstracts relating to their specific subjects. In many cases at the present time these fields of interest overlap. For example, again from my own subject, many of the abstracts published by the Society of Chemical Industry overlap with the fields of the "Iron and Steel Institute Journal" and of the "Journal of the Institute of Metals." This kind of wasteful duplication of effort could certainly be saved, and would go some distance towards covering the higher cost of the more elaborate abstracting system here advocated. On the other hand, it must be recognised that the publication of abstracts relating to special branches of science and technology is a matter of great importance in connection with the publication of the journals of such bodies as the Iron and Steel Institute, the Institute of Metals, and others. It is more than doubtful whether these institutes could forego the publication of

such abstracts in their journals. On the other hand, it might be perfectly possible to have all these abstracts prepared under the auspices of a central bureau maintained by the financial co-operation of all the bodies interested and yet to apportion the publication of the abstracts relating to their particular spheres of interest to each body, so that these abstracts could appear in their journal much as they do at present. In addition, it should be possible to arrange for reprints of the abstracts, possibly printed upon one side of the page only, to be made available at suitable intervals for those who desire to arrange their abstracts on card indexes or in some other manner. While it would not perhaps be a simple matter to secure the co-operation of all the bodies interested in abstracting of scientific and technical subjects, and while it is admitted that the cost of such a system as that proposed is probably considerably higher than the cost of preparing abstracts on the present lines, it would seem that such a system, when once established, would prove so beneficial to all those who have to keep themselves abreast of progress in science and technology, that it should not prove an insuperable difficulty to secure the necessary support.

DISCUSSION.

COLONEL JOHNSON, in opening the discussion, said it would no doubt be very desirable if some clearing-house for abstracts could be brought about, but that it would mean a very large expenditure; there was also the difficulty of filing these abstracts to be considered, as the average research worker wanted abstracts only from one class of paper dealing with his own subjects and not those on outside subjects.

DR. TRIPP said that it should be possible to have two sets of abstracts, one where the subject is dealt with fully and one briefly, and also suggested it would be an advantage if a series of critical abstract reviews could be published, perhaps every two years; it was not easy to be really critical if the abstract had to be made shortly after the work was done.

DR. HUTTON said that some much more systematic treatment of abstracting was needed, and although he understood the need for a review of abstracts he thought this should be dealt with quite separately. He mentioned the American suggestion of a short abstract written by the author himself briefly indicating its contents, though he wondered if this was a fair and proper way of abstracting an article for the subsequent use of technical papers throughout the world. An analytical abstract, kept as short as possible, was of great use to those who wished to see quickly what the article contained. It was also of importance that the main points of an article should be set out in the form of sub-titles.

MR. PEARCE pointed out that while the proposals put forward by Dr. Rosenhain were admirable for the research worker and expert, a good deal of abstracting was done for others who wished to have certain articles brought to their attention, many of which they were quite unable to read for themselves because of their wide variety and the fact that they were in many different languages. He considered it was important not to have critical abstracts. Dr. Rosenhain seemed to imply that a review should act as a criticism, but he maintained it should act as a survey, the main object being that it should indicate to a reader whether it was necessary for him to consult the original. He and Dr. Rosenhain had two very different sets of people in mind, and though they required to see the same material their requirements from these articles were so different that he considered the only thing to be done was to put it down as a simple statement and leave it to the readers themselves to judge how far it would be of use.

The idea of an abstract by the author appealed to him, though there might sometimes be a good deal of risk in letting an author assign himself his proper place.

MR. SHAW SCOTT said that there were great difficulties in the way of forming an international bureau of abstracting, the chief one being the expense, and he rather doubted whether there would be enough support from the papers who would

take these abstracts to make the scheme practicable. Also Dr. Rosenhain seemed to suggest that the ordinary abstracting schemes should not be shut down entirely, which would mean an additional expense to the papers.

With regard to authors abstracting their own papers, this practice had been adopted for the last three or four years at the Institute of Metals with, on the whole, satisfactory results. The abstract was prepared by the author on the ground that he, more than anyone else, knew what was in it. There was, of course, the danger that the author might be either too fulsome or too modest, but the editor was there to see that he fairly represented what was in the paper. He considered that the chief justification for unusually long abstracts was in the case of foreign papers and others that were not readily accessible.

MR. TURNER said that as far as the highly technical work on which he was engaged was concerned, a series of critical abstracts were greatly needed, but in view of the fact that each critical abstract would need preparing for the use of so many different people with different needs and requirements he doubted the practicability of forming a Central Bureau. He added that the only people who could give a really critical abstract were those who knew as much about the subject as the author.

DR. THORNE pointed out the difficulty the outside worker might have in getting at what he wanted from the reviews made by an expert of the Central Bureau. There was a good deal to be said for the use of the author's abstract, as he should certainly know what were the most important points in his own paper.

MR. TRITTON also considered that the chief argument against the formation of a Bureau of Abstracts was the fact that there were so many people with different interests dependent on the abstract. Dr. Rosenhain appeared to have in mind rather the pure chemical worker, but there were many others to be considered. He said that the work of a Central Bureau would be very large and it would be almost impossible to cover all fields. For instance, the photographic abstracts of chemical articles were very incomplete, and a staff of at least double the size would be needed to cover these adequately. Mr. Tritton also called attention to the importance of indexes to abstracts.

MR. ROTTENBURG said that to his mind the most important point was that Dr. Rosenhain himself supported this Central Bureau. He suggested that the first step towards it would be to prepare an exhaustive statement of the cost of founding it, how much the abstracting papers pay now, how much it might cost in the future, and so on. He would like to propose that ASLIB should collect the data as to the financial position with regard to abstracting.

DR. ROSENHAIN, in replying, said that he was glad that the subject had aroused so much discussion, and it showed by the divergence of views that it was a subject well worth discussing. The difficulties in the way of the formation of a Central Bureau were very great, but he did not think insuperable, especially if at first it were to be confined to a certain branch, say, chemistry, and then to be worked out from that. As to the finance, he thought if people got together and prepared an estimate of the money required it would not be found to be excessive. He had not expected his scheme to meet with wide approval, but what he appreciated as the chief criticism was that although it might be possible to prepare the main scheme of abstracts as suggested, it would only be possible to do it from one point of view, and that, as so many abstracts are wanted, it would not be possible to meet everybody's requirements. If, however, the necessity of specialised treatment for specialised cases was allowed, most of the criticism against the scheme fell through.

Objections had also been made to critical reviews, but he considered it was impossible to judge an article from an impartial review. It would mean that the article itself would have to be read, and there was not enough time to do this. With regard to the suggestion that an abstract should lead the reader on to consulting the original, it should be remembered that in many cases it would be quite impossible for him to consult it, and it was therefore necessary to give the reader an idea of the article by definite critical treatment. An abstract should give an intelligent and sufficiently detailed account of the paper, drawing attention to the point which might be doubtful or conflict with the statement of others. With regard to the author's abstract, he thought that there was a danger that these might at times be very misleading.

His proposal was that the publication of the abstracts relating to a large field should be continued to be published by the journal concerned, but that the abstracting itself should be centralised.

Civic and Regional Surveys : Their Relation to Information Bureaux.

BY ALEXANDER FARQUHARSON, M.A.,
of Leplay House, Westminster.

A history of the movement towards Civic and Regional Surveys in this country (when such a history comes to be written) would perhaps have to commence with the story of the growth of the survey idea in a more general sense. That idea is no more and no less than one of the root principles of science. In popular terms it may be expressed as the need for a comprehensive and detailed study of any set of phenomena before general statements about these are made, or attempts to turn them to practical account are initiated. While, however, this principle finds general acceptance in the field of natural science, its application to human affairs has been slow, and is as yet incomplete. We need only glance at the history of our national statistical surveys—from the Census of population to the Census of Production and the Ministry of Labour statistics—to understand how recent and haphazard has been the development of the survey idea in this general sense. Still more recent is the emergence of the conviction that a survey of a locality, *i.e.*, a civic or regional survey, may be of interest to the student and of value both to those interested in education and to “practical” men. This idea was proclaimed with vigour from the Outlook Tower in Edinburgh by Professor Patrick Geddes for many years before the Great War, but it is only since 1918 that the movement for such surveys has gathered force and some conception of their methods and purposes has gained wide acceptance.

The Civic or Regional Survey has so far been developed most fully in connection with town and regional planning. Published surveys, such as Professor Abercrombie’s “Civic Survey of Sheffield,” “The Civic Survey of Dublin” prepared by the Civics Institute of Ireland, Professor Adshead’s “Survey of Chesterfield,” and many others at once come to mind in this connection. Such surveys have inevitably given great attention to the mechanical problems of town and regional development—*e.g.*, lines of communication, housing areas, and open spaces ; but social surveys of a more general character have not been wanting. The survey of Tyneside, on which Dr. Henry A. Mess has been at work for three years, and the revision of Booth’s great survey of life and labour in London now being undertaken by the London School of Economics are outstanding examples ; while our efforts at Leplay House and those of our colleagues at the Outlook Tower in Edinburgh are at present mainly directed to the carrying through of such surveys in various localities in co-operation with local bodies. Apart from these intensive efforts there is a widespread interest in the survey idea, and in many centres to-day are found associations or groups of workers giving some time to training in methods of work, and even carrying out serious attempts at local surveys. Among these are Councils of Social Welfare, Rotary Clubs, W.E.A. Classes, branches of Toc H, and branches of the Geographical

Association. The South Eastern Union of Scientific Societies, which has organised survey activities among many of its affiliated bodies, is an outstanding example of activity on these lines. In addition, Manchester, Liverpool, and other centres have formed Regional Survey Associations, which have been at work for some time on surveys of these cities and their surrounding areas.

It may be well at this point to explain simply what is meant by a Civic or Regional Survey. Such surveys are (or at least should be) comprehensive and systematic accounts of the localities with which they deal. Civic Surveys are those which are mainly or wholly restricted to urban areas having a more or less fully organised town or city life; a Regional Survey takes account not only of an urban centre or centres, but of the surrounding tract of country—the surrounding *region*—which has close economic and social relations with such a centre. It is conceivable that surveys of purely rural areas might be made; and such surveys might appropriately be called Rural or Rustic Surveys. It is hardly necessary, however, to give attention to these latter as a separate class, for the social and economic relations of any rural area in this country to its related urban centre or centres are too important to be neglected, and such surveys therefore inevitably become regional.

It has been suggested above that the surveys here being considered should be comprehensive and systematic accounts of localities; this requires expansion to make its whole implication clear. Civic and Regional Surveys are comprehensive in the sense that they attempt to deal with all the conditions operating in a locality and with all the aspects of life there. Thus the rock structure of a region, its soil, its general conformation—hill, valley, plain, shore—its climate, its animal life (wild and tame), are all ideally to be included in the scope of a Regional Survey. Even so, only the basic conditions of human life in the region will have been dealt with. The whole superstructure of social life and effort, with its results both past and present, which together make the chief interest of the region and the chief concern of its inhabitants is also to be included in the Regional Survey scheme. Thus all that can be learned of the history of the region and the archæology of its buildings and settlements; the story of its economic development; the details of its social institutions, its working life, its local government, and its home life to-day—all these are appropriate elements in the make-up of the complete Regional Survey. Nor should the future changes and possible developments in the region—the working out of existing tendencies—be overlooked.

It is, however, essential to avoid the suggestion that a survey consists of a mere collection of facts relating to the various topics or aspects mentioned above. A survey must have all these facts and more at its disposal, as it were; but it does not become a survey in the full sense until they have been brought into relation with one another—been shown as cause and effect, as influence and tendency, as origin and succession. Thus the bearing of soil structure and climate upon plant life and agriculture—the bearing of rock structure upon quarrying, mining, and building—the bearing of hill and valley systems upon places of settlement and lines of communication—and the bearing of agricultural systems upon population, both animal and human, must all be investigated and clearly displayed. Again, the relation of urban

occupations to situation and local resources, their influence on population and employment, their bearing upon class distinctions, social ideas, and education, and their relation to housing, home life, and spare time occupations, must be brought out. Other aspects will at once occur to those with special interests—*e.g.*, the influence of race types on local life, the relation of occupation to local government, and so on. And it need hardly be said that the relation of the local life to the life of the greater world outside—national and international—must be kept constantly in mind and brought out in all its important aspects.

In any discussion of such surveys the question of their purpose or value will naturally arise. To an audience of students it would be easy to argue for the value of a Civic or Regional Survey as pure research; *i.e.*, as opening up new lines of enquiry, showing the unsuspected action and reaction of various factors in the local life, and leading to a synthetic and sociological view of the region as a whole in its development from past into present and from present into future. But those of us who have given much time and thought to the survey movement would not base the case for surveys on the ground of their value to the student as a field for research. We would rather put them forward as an indispensable preliminary to the development—if you like, to the improvement—of any city or region on the best lines. From this point of view, the survey is a kind of stock-taking of a locality—of all its resources, natural and human, the present methods of using them, the results for human life—and has as its necessary complement a plan or scheme for the future. This use of the survey in town planning and regional planning is already fully recognised by town planners and surveyors. But there is no aspect of local life—industrial or business life, recreation, education, even religious life—to which the survey method cannot be applied, or indeed has not been already applied in some cases.

When this view of the Civic and Regional Survey begins to be clear—*i.e.*, when it is seen as a synthesis of all that is known about a city or region, with a practical aim in view—the relation of such surveys to information bureaux can be discussed without difficulty. Broadly speaking, information bureaux can co-operate in the work of a local survey by providing facts to be worked up into the local synthesis. And these facts—to be of the best use—must be, so far as possible, subjected to standardisation—in respect, say, of areas covered, reference headings or index titles, classification, and so on. The suggestions which follow do not profess to cover the ground completely: they are made chiefly in order to raise discussion.

For the facts about natural conditions in a given city or region it is usual to turn first to the local Museum and the headquarters of the local scientific societies, which are often associated with it. Generally speaking, such museums have good collections illustrating the rocks and fossils, and the plant and animal life of their areas. Curiously enough, they often seem to have little or no information about the local climate—rarely have they much to say about local agriculture. The reason will be clear to anyone reading Sir Henry Miers' recent Museums Report. Lack of resources and lack of trained staff are the chief, and these limitations account for the static character of local museum collections and their inability to keep pace with rapidly-changing phenomena.

The facts about the past of an area are generally to be had with comparative ease as the result of the work done by local public libraries and their librarians over a long period. In most centres of importance to-day one can have access to collections of books, pamphlets, prints, and old maps which contain most of the available facts about the past ; and the publications of archæological and other societies which add to this sum of knowledge are always easily available.

It is when we turn to present-day industry, commerce, and finance that the need for information bureaux becomes most apparent. Generally speaking, there is no centre to-day in any given city from which the facts about local economics can be got with certainty. Some local Chambers of Commerce have certain lists of particulars, and Rotary Clubs are good means of introduction to people who know the business life of the town ; the Employment Exchanges have a mass of information organised from their own point of view. But it is one of the outstanding evils of our present economic system, and one of the main obstacles to schemes for local betterment, that hardly anywhere have we ready access to all the facts of the local economic life. For the present the surveyor who is attempting to deal with this part of his field must get what he can from Government publications, from Government offices, and from the organisations representing employers and employed. A main difficulty in going to work thus is that the facts for a particular area are generally difficult to get, being massed with those for other areas to form some large total. Anyone who has tried to get statistics about, say, railway traffic to and from a particular town by several different routes, the production of some staple article in a particular town, or again, the consumption of a particular article within a given area, will agree that the difficulties are great and sometimes insuperable.

It seems to be matter for careful discussion how far it is fair to expect help from the information bureaux of the great industries, and how far indication could be given by these which would assist regional surveyors in their search for facts. Would it, for example, be possible for the large industrial information bureaux to indicate whether they have their information classified under localities or not ?

In the field of local government we are dealing with well-defined areas ; but everywhere and all the time we are up against the problems presented by local government boundaries which do not fit the modern situation. Everyone, of course, knows cases where extensive suburbs have grown up round an old town and remain outside the official municipal boundary, though intimately linked with the town for most purposes. Such a development generally means that official information about local administration must be sought in county or district offices as well as in the municipal offices of the town ; and it is often impossible to make the information supplied cover the ground to be studied without great patience and much detailed work. To this formidable difficulty must be added another ; there is no standard system, common to all areas, of recording and presenting the facts that fall within the sphere of local government. Everywhere we have the Medical Officer of Health's annual report ; though these reports vary greatly in quality and interest from place to place, they are, taken as a whole, invaluable records. In education, in spite of

its great recent developments, we have nothing comparable ; local enquiries in different areas lead to the production of documents which in some cases give a complete and interesting report of the year's activities, and in others contain statistics pure and unalloyed ; while in other cases nothing at all can be had. The same holds good of other sides of local government work.

When we examine the field of voluntary effort difficulties of a somewhat different nature are revealed. It is common form for every voluntary organisation to issue an annual report, with list of subscribers and accounts ; but beneath this appearance of uniformity are found extraordinary variations in practice. In some cases we have well-written, fully-illustrated reports, dealing with every aspect and particularly every fresh development of the work of the organisation concerned during the past year, giving statistics both in figures and in diagram and graphic form, and even sometimes providing a map showing the area covered by the operations of the organisation. Materials like this make the work on a Civic or Regional Survey a pleasure ; but they are rare indeed. Generally speaking, annual reports are drawn up on no system other than the imitation of the previous report, itself the last of a series which no doubt commenced by imitation of the annual report of some other organisation. They are extremely defective statistically ; they rarely use up-to-date diagrams or graphs ; their financial particulars are often difficult for an outsider to understand, and they take for granted a great deal of knowledge which may be in the background of the minds of the managing bodies responsible for them, but is by no means obvious to a fresh student of the activities they attempt to describe.

Another element in the situation deserves mention. The local branches of central government organisations—*e.g.*, the Inland Revenue Offices, the Employment Exchanges, the Customs and Old-age Pensions organisation, and also the judicial system and magistracy, have in general no necessary connections with local government bodies and arrangements. Each Department or Ministry tends to establish its own branch areas for local purposes ; these often do not coincide with any local government unit. Each Department again tends to keep its records in its own style, which is presumably the style most convenient for consultation at headquarters ; and the provision from these records of facts required in the course of a local survey has in general to be authorised by headquarters ; often, indeed, it is easier to get the facts direct from headquarters than through the local branch.

The point made with reference to the judicial system can be illustrated by the case of an important county borough which lies across the border of two old or "geographical" counties, and has no Court of Quarter Sessions. Here information about important cases occurring in the north of the borough must be sought in a great city four or five miles away, while to get the facts about those in the south a journey of about fifteen miles to a small country town must be undertaken.

Nor is this all. Every year sees the publication of many Parliamentary and official papers containing facts and statistics relating to each locality. These statistics—from the census of population onwards—are indispensable to the work of a local survey ; but it is very rarely

that we find any local attempt to collect all such local statistics, either at the local library or in the local municipal offices. An active worker may be driven to looking them up at the London School of Economics or at the British Museum, or even, as a last resource, to purchasing the publications containing them!

If the survey movement is to grow as it might, and if the Civic or Regional Survey is to take an important place in our schemes for the development of local economic and social life in the future, some attempt must be made to straighten out these crooked paths and make plain these rough places. The paper can best serve its purpose by putting forward a simple ideal scheme with the proviso that the details must be worked out step by step in each locality. Our aim then must be : *The development in each important city or town of a central pool of information about all aspects of the local life, including all published materials, past and present, and current statistics and similar information, official and unofficial.*

It must at once be added that this does not imply the setting up of a new institution specially for this purpose. The work could be done by a combination of the efforts of the local museum, the local library, the Chamber of Commerce, the municipality and other local government bodies, and the local associations interested in social and philanthropic work. One may suggest a division of the task in accordance with some simple scheme such as the following : The local museum could collect all materials relating to natural conditions and agriculture ; the local library could be responsible for all historical materials, and also for Parliamentary and official publications containing present-day statistics and information about the district ; the local Chamber of Commerce and Rotary Club might develop an information bureau dealing with the whole round of commerce, industry, and finance in the area—this of course in co-operation with employers' associations and Trade Unions, and with such official organisations as the Employment Exchange and the Customs Office. The local Council of Social Welfare (which already in many cities is bringing about co-operation amongst philanthropic bodies) is the natural centre for information on the activities of such bodies, and could assist in the collection and organisation of materials by pressing the introduction of standard schemes in their annual reports and other documents. Local government bodies could assist by developing standard systems of presenting facts about their work. Thus municipalities could aim at summarising the work of each of their departments on a standard plan similar to that used in the case of the Medical Officer of Health's Report, and at making copies of such summaries available to the public, or at least to serious students. If this process could be carried so far as the issue by each municipality of an annual handbook or general report covering all aspects of its activities, with a suitable apparatus of statistical tables and diagrams, a great step forward would have been made. A Survey Committee, including representatives of all the bodies co-operating in the pool of information, viewing the field as a whole, and keeping the idea of synthesis in the foreground, would complete such a scheme.

What has already been said may seem to have urban surveys too much in mind. May I, therefore, in closing, add a suggestion on the area organisation of surveys ? Broadly speaking, we can divide urban

areas in England into two classes : (i) older cities and towns which act as market and social centres for rural areas round, and (ii) newer towns or urbanised areas which are generally industrial, commercial, or merely suburban in their interests, and have few links with their rural surroundings. There are, of course, many varieties and combinations of these two types to be found. Again speaking broadly, the straightforward solution of the difficult problem of areas for our purposes would seem to be (i) the association with the old towns and cities of the surrounding districts having social and economic links with them, and (ii) a scheme for dealing separately with the other urban and urbanised areas. Where these are large they are no doubt capable of acting as units for our purpose ; in other cases the county is the unit which naturally comes to mind. It would certainly be a step of the utmost importance if the counties could initiate or assist schemes for the development of information bureaux on the lines above suggested for the whole or parts of their areas.

DISCUSSION.

MR. E. A. MARTIN raised the question as to what bodies would bear the cost of publishing the results of Regional Surveys. MR. J. WARNER, MR. BERWICK SAYERS, MR. F. A. HOARE, MR. H. FARR, and MR. W. BENSON THORNE joined in a discussion as to the part which the public libraries could play. The necessity of public departments depositing copies of their documents and reports in the public library was urged, but it was pointed out that these were often of a confidential character. MR. GUY KEELING and MR. F. D. KLINGENDER also took part.

A Book Review Digest.

In opening this informal discussion, MR. C. RAE GRIFFIN said :

In periodicals of standing—*e.g.*, "Nature," "Engineer," "Engineering," "Mining Magazine," and such—reviews will be for the most part reliable guides, especially where signed or initialled, but it occasionally happens that the reviewer is a friend of the author, and under such conditions criticism can hardly be expected. Conversely, there is such a thing as jealousy. Further, the reviewer may be a "theoretical" man and not altogether capable of valuing the work of a practical man.

In the case of lesser journals there is often a very close association between editorial and advertisement departments, with the inevitable result.

Consequently a Book Review Digest which must reproduce (all or part of) all reviews which come under its notice means the expense of printing much that is of very doubtful value, often quite misleading.

It is obvious that to render a Book Review Digest a financial success it must either have a strong backing from an interested party, which destroys its value at once, or must rely for the sinews of war upon advertisements. Those of a general nature are hardly to be expected in any numbers.

The margin between cost of production and published price is now so narrow that technical publishers, at any rate, are not in a position to do much, and it must be remembered that it is libraries which are largely responsible for the present high price of books. By offering for use to a wide circle, they limit the number of copies that can be sold and therefore printed. A little help from vendors of library equipment, filing systems, and the like might be forthcoming, but such firms can more adequately reach their clients through the post.

Through the kindness of the Secretary of this Association, I have been able to examine a Book Review Digest published in America by the H. W. Wilson Company. This seems to be part of a larger scheme. There are 100 pages of text and eleven advertisement pages, of which four are occupied by the publishers of the Digest. Without information as to the number of subscribers to the Digest it is not possible to form an opinion as to whether this is self-supporting. If so, it is probably by reason of the fact that it forms an index to books published as well. On the other hand it may be financed by the book trade, or a portion of it. The price is \$8 for ten issues per annum—say 4s. per issue.

In conclusion, I am of the opinion that the book buyer is better served by a good prospectus giving full contents of a book and author's preface, coupled with a subscription to the leading journal devoted to the subject in which he is interested, but best of all he should keep in touch with a live bookseller and personally examine all books on his subject.

The problem for the librarian is a little different, but so far as technical books are concerned, by watching the names of author and publisher and avoiding "pot boilers"—which should be an easy matter—his task should not be a difficult one.

DISCUSSION.

At the conclusion of the meeting the following resolution was passed, on the motion of MR. F. E. SANDRY, seconded by MISS M. GILBERT: "That the Council of the Association be asked to consider the possibility of publishing a periodical list of current scientific and technical books at intervals not longer than quarterly with critical evaluations."

Durability of Printed Papers and Manuscripts.

By NORMAN PARLEY.

The League of Nations has taken the first step towards establishing international standards of durability of paper. Now is the acceptable hour for all who care for books to support the five recommendations of the Committee of Experts, which met in Paris, on 30th and 31st January, 1928. These are given in full in the Appendix to this article. It must be borne in mind that the resolutions have still not been submitted either to the International Committee on Intellectual Co-operation (under whose auspices the Experts met),* or to the League of Nations, "so that the attention of all Governments may be drawn" to them. This is notwithstanding the fact that the Experts state that the situation, as regards rapid deterioration of documents and printed matter in public record offices and libraries, "threatens to become extremely grave." It will be seen that they express their belief that practical steps might be taken without serious difficulty to remedy this situation.

What is needed, I suggest, is that (*a*) in the international sphere the National Library Associations should pass and forward emphatic resolutions to the League of Nations, to the end that the Council of the League should take submission of the resolutions, draw the attention of Governments to them, have the investigations continued, and secure the issue of bulletins here recommended; and (*b*) in the national sphere specifications of durability for important documents be determined, such as the German Government adopted in 1893, and the United States Government passed into law in 1911. This would involve the foundation of a public paper testing department or office, as established in Germany, Austria (1885), France, and other countries.

Before making definite suggestions for standards of classification, it will be well to recall briefly the history of this subject. By far the most important document in English is the report of the Committee on "The Deterioration of Paper," appointed by the Royal Society of Arts as long ago as 1898.† This has long been out of print, but there are copies in the British Museum, Guildhall, and other libraries.

The Report itself, containing only 3,000 words, is a very able piece of work. Its specific findings are given on a later page. In the main, they apply as cogently to-day as they did then, and have become more urgent in view of the increased use of mechanical wood pulp (the villain of the piece) and the threatened shortage of cotton and linen rag (the faithful-to-the-last heroes).

Following the Report is an appendix, occupying most of the pamphlet, consisting of 87 Abstracts, from Papers on German Official

* While revising proofs of this article I learn of action taken by the International Committee (August, 1928). See Appendix B.

† Royal 8vo., 44 pp. and cover.

Reprinted, by kind permission, from the Library Association Record, September, 1928.

Tests, 1885-96. Here is a summary of those which bear most on the present subject :

- No. 15. Germany, 1887. Only 6, out of 97 papers tested, pronounced durable by Charlottenburg Institute.
- 19. Austria, Finland, and Denmark, 4 out of 49 passed. Of these 4, 2 were from the State Archives at Copenhagen and were a century old.
- 23. German Imperial Government sent 26 printing papers. None passed tests, either for substance or strength.
- 24. Japan, hand-made. Substance good (rag), but sizing wrong.
- 40 & 43. German official (Charlottenburg) classification.
- 45. Dutch hand-mades. 0 out of 10 passed.
- 46. Historical notes. 1739, French Council Order : "Papers must be wholly made from rags ; no caustic used in preparing pulp ; must be sized." 1756, Bohemian Council Order, deals mainly with apprenticeship. 1756 to 1886, no attempt to regulate the paper industry can be traced. 1893, Watermarks demanded on Government papers, giving trade mark of paper, and class mark (1, absolutely permanent ; 2, for documents, registers and account books ; 3, for deeds and briefs ; 4, not required to last more than a few years).
- 69. Berlin, "good" writing papers, 6 out of 35 passed. 85 per cent. quite unfitted to endure, although sold as the highest class of paper.
- 71. Germany. Adoption of Government standard increases the number of papers satisfying the conditions, from 57 per cent. in 1890 to 85 per cent. in 1893 and 88 per cent. in 1894. Number of makers submitting papers for test remained at about 450. Of papers sold, other than to Government, 73 per cent. satisfactory in 1894.

These last figures prove that the suggestion (*b*) above, if as successful in this country as in Germany, would go far to secure durability for printed matter of national importance. Even better results should be obtainable, for British-made paper is admittedly the best in the world. That firms publishing the better class of literature would soon provide class-marked paper may be taken as probable.

At present there is no standard of durability in this country, only comparatively fancy papers are watermarked, and price is no guide whatever.

The specific findings of the Society of Arts Committee's Report may now be usefully compared with the more elaborate German conclusions. Here are the former :

PAPER MAKING FIBRES.—In order of permanence (under normal treatment) :

A.—Cotton, flax, and hemp.

B.—Wood celluloses (*a*) *sulphite process*, and (*b*) *soda and sulphate process*.

C.—Esparto and straw celluloses.

D.—Mechanical wood pulp.

NORMAL STANDARD FOR PERMANENT BOOK PAPERS.—Specification :

Fibres.—Not less than 70 per cent. Class A.

Sizing.—Not more than 2 per cent. rosin, and finished with normal acidity of pure alum.

Loading.—Not more than 10 per cent. total mineral matter (ash).

For written documents, a pure A paper, sized with gelatine, not rosin.

The German official (Charlottenburg) classification referred to above (40 & 43) is briefly :

I.—COMPOSITION.

Class 1. Papers made from rags only, containing not more 3 per cent. ash (mineral).

2. Rag, with additions of cellulose or esparto up to 25 per cent., but free from mechanical pulp. Maximum of 5 per cent. ash.

3. Any componen's except mechanical wood. Maximum 15 per cent. ash.

4. Any materials and any per cent. ash.

II.—STRENGTH.

Six classes are given, with standards for tearing length, elasticity, and resistance to crumpling. Minimum mean elasticity is 4.5 per cent. in Class 1, 4 per cent. in Class 2.

III.—USE.

			Composition, Strength.
1.	Most important matters	... ..	I—1
2.	Documents, registers, and account books	... ..	I—2 & 3
3.	Briefs and documents for filing	... ..	II—3 & 4
4.	Documents and letters, not intended for long life	... ..	III—3 & 4
5.	Envelopes and wrappers	... ..	II & III—3 & 5
6.	Impermanent	... ..	— —
7a.	Outside covers, for continual reference	... ..	I—4 & 5
7b.	„ for less used documents	... ..	III—4 & 5
8a.	Printing papers. More important	... ..	I—4
8b.	„ Less important	... ..	III—4
8c.	„ Current only	... ..	IV—

The Society of Arts Report gives in Appendix 2 a précis of correspondence with papermakers, publishers, librarians, chemists (3 pp.). The Publishers, Ward Lock and Co., state (1897) :

“Tendency of papers of the present day to perish is a serious and universal evil. Owing to the use of wood pulp, etc., 99 out of 100 books will not be legible 30 or 40 years hence, and some of the lower class publications will decay in 12 or 13 months. Suggest the establishment of an Official Analyst.”

The Librarians' comments are illuminating :

BARROW-IN-FURNESS. Free Public Library. Paper in majority of books not permanent enough for Public Library use. Books break away from their stitchings and often crumble away. Has often

advocated special editions on strong paper for library use. Cost 1s. a volume extra.

BIRMINGHAM. Central Free Library. Some of the big daily newspapers printed on such wretched stuff that they cannot last any length of time. Serious to Institutions which bind them.

HAMMERSMITH. Central Library. In lending department the paper of the illustrated magazines is the worst.

BERMONDSEY and MANCHESTER. A decided change for the worse in the quality of paper.

NOTTINGHAM. Rapid chemical change in paper of two works issued by H.M. Stationery Office, "Calendar of State Papers" (1884), "Chronicles and Memorials" (1896).

BODLEIAN. Liddell and Scott's Lexicons suffer from crinkling and tearing through undue thinness of paper.

Before leaving this Report I must mention its own condition. Issued just 30 years ago, the inside paper of my copy shows slight discolouration towards edges, but this is superficial. Under the microscope it proves to be a good rag paper. But the cover is in a deplorable state. It was once blue, but its outer edges are now the colour of strong coffee and are broken away and brittle. This is due entirely to the presence of mechanical pulp.

From time to time other librarians have pleaded for "good paper for good books." That is the sub-title of a finely produced and written article by H. M. Lydenberg, Chief Reference Librarian of New York Public Library.* It is interesting to note that this is copyright by the Paper Manufacturers' Educational Association, New York. He states :

"The American Library Association has taken official action as to the binding of some books . . . has expressed itself as against the use of India paper for a library edition of the *Encyclopædia Britannica*, has appointed committees on book buying and book binding, but has never said it wanted books for library use printed on paper that would last.

" . . . that monument to British scholarship, the Oxford English Dictionary, bears the imprint of the Clarendon Press. But look at Vol. I of the Dictionary, printed in 1884, just forty years ago. The paper is brittle, its edges are burned. It is hard to believe the Clarendon Press would print a work of such importance on anything but an all-rag stock. But if it is rag it is not well made. The sheet feels dead, lifeless. And the paper of the 'Concise Oxford Dictionary' is worse."

The author goes on to give evidence that the state of things on the Continent and in America is worse :

"But the eminence in the realm of poor paper for a work of supposed permanent value stands unsurpassed in the volumes of the 'Congressional Record.' It is safe to say that not a shred of rag was within miles of the mill that ground out this paper . . . some day a Committee of Investigation will recommend that a few copies of each issue be printed on a rag stock and sold at cost to libraries willing to pay for the privilege of keeping these important documents for the use of coming generations. But the volumes

* Paper or Sawdust. 1924. 4to., 12 pp. B.M. 7942.1.2.

printed between the eighties of the nineteenth century and the time when the Congress wakes up, will have disappeared . . .”

From the above, written in 1924, it would appear that the specifications passed into law by the United States Government in 1911 have dealt only with State publications.

I recently talked over the Experts' recommendations with a firm of analytical and consulting chemists, who have made these subjects particularly their own during the last thirty years. They said :

“ The opinion usually held that papers made of linen and cotton are the only permanent ones, should be subject to some qualification. A thoroughly well made sulphite paper may actually be more permanent than a rag paper which has suffered in the bleaching process—a thing which happens too frequently under commercial conditions. The new processes of treating cellulose, mentioned by the Committee, seem likely in the future to be justified by the production under factory conditions of a solution of viscose which will replace gelatin. This has taken place with regard to canvasses, as may be read in the preliminary report of the sub-committee on Materials of Painting, appointed by the Royal Academy, which was issued in May last. It is more difficult to extend this improvement to mill conditions for paper manufacture, but would render paper freer from liability to attack by mould. Another advantage would be elimination of absorbency of moisture.

“ Regarding ink, there is sufficient carbon element in practically all printing inks which are in use to-day to preserve the ink longer than the paper it is printed on. This does not apply to typewriting, most of which is done with inks made from aniline dyes containing little or no percentage of carbon—the indestructible element in ink.”

When one considers how many important letters are being typed without any regard to the permanence of either paper or ink, one sees how necessary it is to introduce enlightened methods. Those who know have been recommending for many years past that the copies of newspapers, etc., which are distributed under the Copyright Acts to the five main libraries in the United Kingdom, should be printed on durable rag paper. The overcrowding in libraries through the enormous production of printed matter is common knowledge. In the United Kingdom last year we produced a new book (apart from reprints, translations, and pamphlets) for every hour in the year, namely 8,760. The position will be much worse if tons of deposits become discoloured within a few years, which will certainly happen with newspapers printed on paper made from mechanical pulp.

The reason for this is that the mechanical methods in use for pulping pine and spruce and fir reduce it to a state in which it has no fibre length. It is merely ground wood. Consequently there is no felting or binding of the fibres. Yet it is upon this very principle of “ fibrillæ,” felted by a machine imitation of the vatman's “ shake,” that the making of paper by machinery has always depended.

From 1495 until to-day paper has been made by hand in England by the same process. The vatman lifts sufficient pulp in his mould (sieve) to make a sheet of paper. The water drains through, leaving the fibres on the surface. To interlock the fibres he gives a rapid jogging motion to the mould before the paper is allowed to drain ;

this gives enormous increase of strength to the sheet, the fibres of which are interlocked in all directions.

No machine can fully emulate that few seconds' work, yet to see one of the huge modern machines, from 90 inches to 120 inches wide across the web, imitating that "jog" continuously, is to wonder at man's ingenuity. It was in 1806 that John Dickinson's fertile brain invented the Cylinder paper making machine for producing a continuous web of paper. That identical machine is still at work. When the process is briefly explained, the importance of fibre length in the material of papers becomes apparent, and with it the reason for the Experts' insistence on rag papers.

The paper making machine, at its "wet end," has a hollow revolving copper roll full of narrow slits. This strainer keeps back unseparated fibres in the stuff which flows, like thin gruel (about 98 per cent. water), on to a travelling endless wire sieve. The fibres at this stage are like minute floating straws, side by side. As the water is drained away, the fibres settle down and cling to one another, aided by a strong jogging movement of the entire wire part. The longer the fibres, generally speaking, the firmer the felting.

Esparto grass fibres, however, are shorter, and owing to their conformation, deficient in felting power. That is why many of the mellow opaque ("antique") papers, commonly used for bulky books, will not endure long. These include the "featherweight" *esparto* papers, made in Scotland, on which publishers insist on printing novels and, more excusably, children's books. As a component, *esparto* is very valuable to papermakers because of its kindliness and bulk; but as a durable main substance it is probably a broken reed. (Hence the limit of 25 per cent. *esparto* in Charlottenburg Class 2). Two eminent paper chemists whom I have recently consulted agree that *esparto* has to be isolated so drastically that to obtain a pure cellulose from it is almost impossible. One papermaker, however, has recently invented a method of treating *esparto* paper which, among other things, increases its breaking strength. Whether this result will be permanent remains to be proved.

Up to 1860 it may be said that durable materials were consistently used for all paper making in this country. Disintegration and or discolouration in papers made before that date is almost invariably due not to the "furnish" (*i.e.*, material), but to chemical faultiness. Advances in knowledge have partly eliminated this factor. Where it obtains to-day it does so through the pressure of the demand for cheapness rather than through ignorance.

A close textured, well compacted, sheet is necessary for permanence. The right method of obtaining it is by thorough beating, which is costly in time and power. The wrong method is by the excessive addition of sizing and loading agents. Cheapness is often obtained by over-bleaching.

About 1860 came *esparto*, followed by mechanical wood pulp about 1870, and the wood celluloses about 1880. The last named differ in chemical composition from the celluloses obtained from cotton, flax, and hemp, which had previously been the exclusive staple raw materials. As it is with this class of raw material that experiment is continuously being made I am glad to be able to give an authoritative opinion upon it by a distinguished paper chemist,

with whom I recently discussed the formulation of standard classifications for durability :

"The introduction of carefully prepared chemical wood pulp (to an all rag furnish) would produce a fairly stable paper of good durability, but even with the highest degree of purity this would deteriorate more rapidly than pure cotton or linen fibres. This is owing to the drastic chemical treatment which is necessary to isolate chemical wood fibres. Even so-called Alpha wood pulp shows a certain amount of degradation of colour on exposure to light and heat. Nevertheless, such a paper should have good ageing properties and should last for many hundreds of years if carefully prepared."

It will be noticed that the percentage of chemical wood is not here given, although in conversation 50 per cent. was mentioned as a possibility. This would affect price considerably. The proportion able to be used for graded papers would have to be ascertained by actual tests.

CONCLUSION.

There is agreement on all main issues between the German Testing Institution, the Society of Arts' report, the International Experts' resolutions, and the consensus of opinion of makers and paper chemists to-day.

From a combination of these agreed factors, but with special attention to chemical purity, we may now attempt to specify a standard normal grade of *durable* papers, which could be made at a reasonable price.

Furnish A. Cotton, flax, hemp.

Furnish B. Wood celluloses.

Treatment a. Unbleached, or approved bleaching. Approved alkaline boiling. Pure and acid-free sizing. Ash maximum 5 per cent. Fibres well preserved and felted.

Price. At a recent unofficial conference of chemists, merchants, a Government expert, and the writer, the following scale of ratios for graded papers was estimated :

Z. Aa paper, for greatest possible permanence ... Price ratio, as 5

Y. $\frac{1}{2}$ Aa $\frac{1}{2}$ + Ba, for very high durability ... : 2

X. Average competitive book papers of to-day ... : 1

From this it will be seen that the cost of what we may name complete permanence (Z) is so high as to be of only theoretical interest. The grade Y, however, corresponds nearly to the Charlottenburg class II, but takes advantage of the great progress now being made with wood celluloses. The specification is intended to be rather provocative than determinative. The whole object of this article is to stimulate interest, leading to that action which is eloquence, in the present international opportunity for standardising durable papers, recognisable by watermark. To this end it is essential that the main recommendations of the experts be accepted.

Paper chemists in this country are at present entirely unsupported by any educated demand for durable paper. The acceptance of standards, maintained by a testing station, and embodied in agreed natural watermarks, would not only focus the attention of the best paper sources on the evolving of better and cheaper grade Y papers,

but would eventually be supported by librarians, publishers, and public, and tend to encourage the use of honest materials, and methods of manufacture that make for permanence.

APPENDIX A.

INTERNATIONAL INSTITUTE OF INTELLECTUAL CO-OPERATION.

MEETING OF EXPERTS FOR THE PRESERVATION OF PRINTED PAPERS
AND MANUSCRIPTS.

(January 30-31, 1928).

RESOLUTIONS.

In view of the duty incumbent on Governments to preserve for posterity the history of their peoples in all their diverse manifestations by ensuring that documents and printed matter of all kinds in their public record offices and libraries shall not suffer from rapid deterioration, as it is feared may happen owing to the inferior quality of the ink and paper employed;

Believing that practical steps might be taken without serious difficulty to remedy this situation, which threatens to become extremely grave; and

Taking into consideration the material collected on this question by the International Institute of Intellectual Co-operation and the technical reports already submitted (see Appendix);

THE COMMITTEE OF EXPERTS RECOMMENDS

That the attention of Governments be drawn to the necessity of using for documents of permanent value, and especially for those of an official character, only papers manufactured according to the specifications detailed below:

- (a) A preference at the present state of the manufacturing process to be given to unbleached rag paper; it being understood that new processes of treating cellulose may in the future provide paper of lasting quality.
- (b) All noxious effects arising from colouring matter, filling, and size, and also from acidity to be avoided.
- (c) Standards for the strength of paper to be established.
- (d) All paper to be marked with a water-mark containing the name of the manufacturer and the specification.

II

That, for the time being, the best ferro-tannate inks be employed, but that encouragement be given to research work with a view to producing other inks having no injurious effects on paper.

That, as regards typewriter ribbons and carbon papers, only papers and ribbons made with lamp-black be employed, and that unless carbon paper is of the finest quality an innocuous fixing agent be applied to the written page.

III

Seeing that for some time past certain British and American newspapers have printed special editions on all-rag paper on their rotary presses, it is desirable that this example should be followed in all countries, in the first place in the official journals and in accordance with the recommendation laid down in paragraph I.

That in cases where it is not possible to print special editions, newspapers to which certain libraries are entitled according to the Copyright Acts, should be covered with Japanese tissue-paper on both sides, as has been done with various newspapers in the United States for the past ten years.

That in any case such newspapers should be bound without delay.

IV

That with a view to preserving manuscripts and printed documents of all kinds, ancient as well as modern, it is essential that all possible precautions should be taken, not only to avoid the injurious effects of excessive heat or dryness, light, damp, insects, vermin, etc., but also the possible deterioration resulting from wear and tear, and lack of attention to binding.

V

That documents and printed matter in museums, archives, and libraries should henceforward only be on temporary exhibition, and that their permanent exhibition, which is a cause of rapid deterioration, should be discontinued.

RECOMMENDATION.

In view of the fact that the results, published and unpublished, of experiments made in laboratories, and in public libraries and archives, upon the nature of writing and printing materials, their repair, make-up, and preservation, are often little, if at all, known to the librarians and archivists of other countries ;

In view also of the fact that all these studies are continually progressing, and that new materials may from time be added to the list of those which Public Authorities are called upon to preserve ;

The Committee of Experts also expresses the hope—

That steps will be taken for the compilation of a bibliographical résumé of the results obtained up to date, for the further compilation from time to time of a bulletin giving briefly information of all fresh discoveries, and for the transmission of these to the Authorities controlling National or Central Libraries and Archives in all countries ; so that the attention of all Governments may be drawn to the necessity of taking full advantage, in respect of documents destined for permanent preservation, of the results of scientific research upon paper, ink, etc.

APPENDIX B.

The resolutions and recommendations contained in Appendix A were approved by the International Committee on Intellectual Co-operation at its meeting in Geneva, August, 1928, when the

following reservation was made to the text of the resolutions:

“The Sub-Committee approves the recommendations of the Experts for the preservation of printed matter and manuscripts, and desires to state expressly that paragraph 1 (a) relates solely to the printing of a few copies intended for preservation in libraries or archives, or transcription of documents which are recognised to be of special importance. The Sub-Committee further desires that the technical work already begun to improve the quality of the cheaper-priced papers should be continued.”

This action by the International Committee further advances the establishment of national and international standards of durability. The resolutions will no doubt be laid before the Council of the League at the next suitable opportunity, and all resolutions in support passed by National Library Associations will strengthen the hands of the International Committee.

SOME NOTES ON THE DURABILITY OF PAPER.

By CAPTAIN J. S. ALLEN. F.I.C.

Three main factors affect the durability of paper :

- (1) The grade of cellulose used.
- (2) The degree of treatment of the cellulose in the mill.
- (3) The amount of rosin, quality of the gelatine, and quantity of residual acid present, etc.

In order to make a paper of the highest degree of durability, paper should be made from pure cotton and linen fibres (particularly cotton), and these should be used in the unbleached state, or the bleaching treatment should be so mild that there are no degradation products formed, such as oxy- or hydro-celluloses. The alkaline boiling treatment should also be comparatively mild, the intensity of the boiling being sufficient to remove any dressing materials present in the fibres without affecting the cellulose itself. The minimum quantity of rosin should be used and sufficient alum used to react with the rosin without leaving an appreciable amount of alum in the paper—that is to say, the paper should be neutral in reaction. The gelatine used should be of a high degree of purity and be free from acid. Such a paper will withstand the action of light and heat without becoming degraded in colour and ought to have exceptional ageing properties. Such a paper would last for many hundreds of years without becoming appreciably degraded.

The introduction of carefully-prepared chemical woodpulp to the above furnish would also produce a fairly stable paper of good durability, but even chemical woodpuls of the highest degree of purity will deteriorate more rapidly than pure cotton or linen fibres. Nevertheless, such a paper should have good ageing properties, and I should say should last for many hundreds of years if carefully prepared. Owing to the drastic chemical treatment which is necessary to isolate chemical wood fibres it cannot be expected that these fibres will have the same degree of stability as good pure cotton and linen fibres.

A paper made from all chemical woodpulp carefully prepared in the boiling and bleaching treatments and also containing the minimum

amount of rosin and no excess of alum, should also produce a paper of good stability, but it certainly would not have the durability of either of the above classes mentioned. I have never yet tested a woodpulp, even so-called Alpha woodpulp, that has not shown a certain amount of degradation of colour on exposure to light and heat.

It does not necessarily follow that because a paper contains cotton and linen fibres that it will have greater durability than a paper containing chemical wood fibres, as cotton and linen can be degraded not only before they reach the paper mill, but also by careless treatment and over-boiling and bleaching. Excessive quantities of rosin and the presence of excessive amounts of alum accelerate the degradation in colour of the paper on exposure to light and heat, and thereby reduces its keeping properties. A microscopical examination alone of a paper is not an indication of its durability, and it is only by testing the paper out chemically to discover the amount of cellulose degradation products present, together with the amount of rosin and alum, loadings, etc., that an idea of the durability of the paper can be obtained. The degree of resistance to light and heat is also a good criterion as to the keeping properties of paper, but paper can also be tested for its physical properties before and after being subjected to heat treatment, and obviously those papers which show the least drop in physical characteristics after heating, together with the least degradation in colour, will be papers which will have the best ageing properties.

It must also be pointed out that outside influences play a part in the keeping of papers, such as the type of inks used. Gallotannic inks of an acid nature have a certain destructive action on cellulose after keeping, and this action is accelerated at elevated temperatures. The type of paste, if any, used in the binding process, and also the quality of the covers must be taken into consideration in making up books for "permanent" records.

DISCUSSION.

Several written communications were received.

MR. H. A. BROMLEY, of H.M. Stationery Office, wrote :

I should like to say, first of all, that I am, generally speaking, in hearty agreement with Captain Allen on the principles governing durability laid down in his excellent paper. On the matter of rosin sizing, I would, in fact, go somewhat further and say that in my opinion a paper is better without any at all. For papers of the very highest documentary importance my Department, the Stationery Office, specifically excludes, and I think rightly excludes, all such materials as rosin and starch. There is evidence to show that rosin, especially in the presence of traces of iron—and you must bear in mind that paper entirely free from iron is altogether a *rara avis in coelo*—in these circumstances there is evidence to show that rosin is photo-sensitive, and you get in consequence a certain amount of degradation of colour in course of time on exposure to light. I am not sure that the same argument does not apply in a less degree also to gelatine. Certainly I have obtained quite suggestive results from exposure of gelatine-sized papers to artificial sunlight, including the complete destruction of all sizing properties. This question of sizing has other difficult aspects, and it may be that what is needed for purposes of permanent record is some other altogether stable sizing agent, perhaps even not of organic origin at all.

Now there is another aspect of the case for durability to which I should like to draw your attention—the practical aspect. I cannot help thinking that the kind of paper visualised by Captain Allen is at the moment largely of theoretical interest only in that it scarcely presents an opening to the paper-maker as a commercial proposition. Without direct legislation there can be little incentive either on the part of the paper-maker to produce or the public to buy what must naturally be a most expensive product.

Then, again, we are inclined to be a little vague as to the meaning of permanency. Let us try to see what we mean by this word. Clearly not infinity of existence, which is not only unobtainable, but sometimes perhaps even undesirable. We must, I think, visualise a term to our conception of permanency. Suppose we put this term of 4,000 years, which I dare say will satisfy the interest of any one here without undue strain. Now there is, I believe, in the British Museum, a document written on papyrus dating from about 2,400 B.C. This document is constructed of material which would be anathema to the experts. It is the lowest of the low, a veritable pariah among celluloses. Yet this execrable material, this degraded type of cellulose, has resisted extinction over a period of 4,000 years odd, and is still decipherable. You will probably object that it has passed the major part of its existence under ideal conditions of storage. True; and this brings me to my last point. Whenever I am asked to expound the principles underlying permanency in paper I invariably assert my belief that storage conditions are nearly or quite as important as the selection of the material. First and foremost you must have a dry atmosphere. You must abjure the use of gas for lighting or heating your store rooms. As far as practicable you should exclude light from your records and protect them from undue access of air. As regards the lighting of the store room, it may in the future even be necessary to obtain this in such a manner as to exclude entirely the harmful ultra violet rays.

Given these conditions and *reasonable* attention to manufacturing conditions along the principles set out by Captain Allen I don't think we need fear for the permanency of our documents, even if we do not select our basic material with meticulous regard to theoretical considerations.

MR. H. L. BACON wrote :

Captain Allan has in a relatively few words covered the whole ground on the essential requirements for the production of a more or less permanent sheet of paper.

I have particularly used the term "more or less" because I think that no matter how carefully paper be made, and however stable the cellulose which is used as the base may be, yet oxidation is certain to take place, aided doubtless by atmospheric conditions resulting in a gradual breakdown of the cellulose.

The author has also not mentioned two other probable causes of deterioration in good-class papers :

- (1) Bacterial attack on the cellulose under conditions of temperature and humidity, and rendered still more acute in tub-sized papers by reason of the fact that the gelatine forms the much-required nitrogenous food. This opens up the interesting question of a permanent germicide.
- (2) The presence of iron salts; the iron acting catalytically as a conveyer of oxygen to the cellulose, gradually forming an oxy compound.

The question of "durability of a paper" is, after all, purely relative, and perhaps the nearest approach to permanency would be to lock up the book or document in a glass case, after completely sterilising it, to evacuate all the air, and keep in the dark till required.

It is in effect the reason that "mummy cloths" have occasionally been found in such an excellent condition after a period of 2,000 years.

With the general ideas as set forth by Mr. Parley I am in complete accord, with one important exception, with which I shall deal at the end.

With reference to the Society of Arts Committee on the "deterioration of paper," I would like to go still further in suggesting a "normal standard for permanent book papers"—namely, that instead of at least 70 per cent. of Class A, *i.e.*, cotton, flax (linen), or hemp fibre furnish, a good book paper should be made wholly of cotton, linen, or hemp, preferably the first named, bleached to a three-quarter standard, *i.e.*, a low white.

Sizing.

Instead of 2 per cent. rosin, the paper should have only 1.5 per cent. of added rosin as size.

The term "normal acidity of pure alum" is distinctly vague, and, as nearly every paper-maker has his own ideas as to what he considers normal, I should suggest that the furnish of the paper should be finished practically neutral in the beater before letting down into the chest.

Loading.

With regard to loading, I think that a good book paper, to stand a fair amount of wear and tear, should be quite free of added loading—*i.e.*, the paper would probably contain between 1 and 2 per cent. of ash derived from the mineral constituents left in the finished pulp.

With regard to the German official classification of Class 2 papers—namely, “rag with addition of esparto or cellulose, and mechanical wood free”—this is rather vague, and I am not in accord with same. Esparto would obviously be added as a cellulose, but, even so, such a fibre has not the inherent properties for stability or permanency owing to the chemical nature of the cellulose—namely, that of being a natural oxy-cellulose. Chemical wood cellulose is a decidedly better adjunct to the rag.

Strength.

Under “Strength” I think the author means “Breaking Length” and *not* “Tearing Length.”

As to the author’s conclusions, the idea of classification of a paper by a special watermark to indicate its quality is, I think, excellent, but I am afraid I cannot agree with his statement as to there being an “educated demand for durable paper.”

In my practice as a consultant on cellulose and the paper industry generally, some hundreds of papers are submitted to me during the year for the expressed purpose of testing them for breaking length, resistance to wear and tear, and other physical tests, together with the character and condition of the cellulose or celluloses.

Just one other point, if I may refer to what is a rather more personal one: Why should the Government set up a department to carry out work for individuals or firms, and thus compete against private enterprise? Surely there are competent people equipped with the suitable apparatus for carrying out such class of work as is required for the testing of papers. One, of course, could argue a great deal on this subject, but I would like to express my thanks to the author for his survey of the requirements for a proper standardisation of permanent book papers.

At the conclusion of this discussion, in which many members took part, the following resolution was passed, on the motion of Mr. PARLEY, seconded by Mr. MCADAM:

“The Association of Special Libraries and Information Bureaux (Great Britain), agreeing that the present position as regards deterioration of documents and printed matter in public Record Offices and Libraries threatens to become extremely grave, and that practical steps might be taken without serious difficulty to remedy this situation:

“Hereby expresses its emphatic approval of the resolutions and recommendations of the Committee of Experts, approved by the International Committee on Intellectual Co-operation, at Geneva, August, 1928, *viz.*:

“That the attention of Governments (should) be drawn to the necessity of using for documents (and printed matter) of permanent value, and especially for those of an official character, only papers manufactured according to (given) specifications.”

“In support of the foregoing it is further resolved that H.M. Government be asked to consider the establishment of a public testing station or public Standardising Committee for the purpose of fixing standards of durability for papers and other writing materials, and of publishing information on this subject with a view to the wide adoption of approved materials for manuscripts and printed matter of permanent value;

“And to consider the advisability of enforcing by Statute the printing of books, etc., destined for the Copyright Libraries on papers of approved durability.”

Information on Accident Prevention.

The following notes were submitted by LIEUT.-COLONEL J. A. A. PICKARD and MR. C. G. INGALL, of the National "Safety First" Association, who opened this informal discussion.

LT.-COLONEL PICKARD :

1.—Accidents and diseases are closely allied and, in far more cases than are necessary, provide overwork for the doctor or coroner and premature employment for the undertaker.

2.—In the case of disease, research and remedy have been going on for centuries, and there is a mass of information on the subject. Even the daily press now publish golden rules of health to prevent disease, but in the case of accidents they merely advise you to fill in the coupon on page so and so. One dead subscriber is worth many new subscribers.

3.—The dearth of really useful Accident Prevention Information is due mainly to two causes. Firstly, there is a sort of fatalistic apathy and an impression that accidents are unavoidable; and secondly the accident problem is primarily of recent origin, and due to the rapid growth of science in the last 100 years, and particularly of machinery and rapid transit.

4.—Accidents in this country claim three-quarters of a million victims a year. The bulk—some half a million—are in industry, and these are all cases sufficiently serious to result in compensation being awarded. Perhaps, like the majority of the general public, you do not realise that the really more important side of the work of the National Safety First Association lies in industrial accident prevention, not in street accident prevention, though the latter enjoys the limelight of press publicity, and so looms the larger. The industrial accident side will be dealt with by Mr. Ingall, our Safety Engineer, and I will confine my remarks to the more spectacular street accident side.

5.—First and foremost I submit that the fact that the annual toll of the streets has risen in the last ten years from 40,000 to 150,000 persons killed and injured demands more attention, research, and information than it is now receiving from the Government. The increase is statistically normal, and proportionate to the percentage increase in the number of vehicles. That is poor comfort to the victims, and no proof that the present ratio is not capable of improvement, improvement which I emphatically state is possible.

6.—The Home Office publish annual totals of street accidents by districts, and according to the vehicle involved. The Ministry of Transport investigate a small proportion of the more serious road accidents of a particular character, *viz.*, where vehicular or road defects appear to have contributed. Various Chief Constables prepare on varying bases accident causation statistics.

Of unofficial statistics there are masses hidden in the archives of insurance corporations.

We have annually for the last three years, with the help of coroners, made an exhaustive analysis of *all* the contributory causes in fatal motor accidents. It is rarely the case that there is only one contributory cause, and a whole paper could be devoted to analysis of accident causation.

For a general summary of such street accident information as is available for this country, I would refer you to a paper included in the Proceedings of the last Public Works, Roads, and Transport Congress held last November; and to papers submitted at our Public Safety Congress in 1926, and later this year.

7.—Particulars of methods employed in other countries are of value. The Proceedings of the National Safety Council of America contain a mass of information, and they are years ahead of us in this respect.

8.—So far as street accidents are concerned, one may generalise as follows : 80 per cent. are due to failure of the human element and the bulk of these are avoidable. The remedy is commonsense, which is the proper definition of safety first, and implies more education of the public. Education must be based upon facts or information, much of which is missing.

9.—There is present this evening a member of the Railway Department of the Ministry of Transport, Mr. J. P. Scott Main, who, I hope, will contribute to this

discussion. I venture to state that the work of that department in tactful co-operation with the Railway Companies and the Unions is largely responsible for the world-wide reputation for safe working which the British railways enjoy. I believe he will confirm that systematic enquiry into the reasons for some of the more prolific causes of accidents and the subsequent application of remedies has resulted in considerable reduction in accident frequency, and that education of the railway staff has produced wonderful results.

There are twenty times as many accidents due to the movement of vehicles on roads as there are due to the movement of vehicles on the railways. Why do not the Ministry tackle the road accident problem on somewhat similar lines to what they have done so successfully on the railway?

10.—This is not a case of statistics for statistics sake. It is a question of scientific research into and scientific remedy for a needless loss of thousands of lives, limbs, and peace of mind.

11.—To summarise I submit:

- (a) That the bulk of accidents are admittedly avoidable.
- (b) That more information upon the subject of accident causation and accident prevention is of increasing importance to the community, and should be at once undertaken by the Government.

12.—Anything, then, which this Association can do to help procure the necessary research and information will be of great value.

MR. C. G. INGALL: In opening a discussion the matter must be somewhat sub-divided. Firstly, the type of information required demands consideration. Secondly, the sources from which that information can be obtained; and thirdly, the information at present available. Of the information required one can only say that very little of any value has, as yet, been done. In order to prevent accidents the cause of them must be ascertained. Accident causation may be divided into two categories: (1) accidents from mechanical causes, and (2) accidents due to failure of the human element. Accidents due to mechanical causes account for only thirty per cent. of the total to be considered, and under this category investigation is fairly easy. It can be generally carried out by a comparatively unskilled observer, a knowledge of machinery, and the operation of the various machines concerned being practically all that is required. At the same time very little information in this respect is available. It is not sufficient to indicate, for instance, that a hand was caught in a power press resulting in the loss of one or more fingers. One requires to know what particular operation was being carried on, what was the nature of the material being fed through the press, the condition of the machine itself, what safeguards were provided, and if they were used and the means employed for propelling the machine under investigation.

Such an accident as described is, on the face of it, due to mechanical causes to, if you will, the misbehaviour of a power press, but it also falls into the second category being due in great part to the failure of the human element. This, then, is the greatest problem we have for investigation and for the collation of information. If we would get to the basic causation of every accident we must not only investigate the machine, but we must investigate the operator. There I think the trained psychologist must enter into the matter, since in very many cases the human element fails because of some outside influence, generally mental worry or mind wandering. It is not much use attempting to conquer this form of accident causation unless we have much greater information at our bidding than we have at present. The available literature on the matter is, in view of the importance of the subject, extremely scanty. So far as my experience goes, apart from the question being dealt with in a general way in numerous text-books on industrial psychology only one investigator, an American, has published any information on the mental causes of accidents. In this country our main source as to the causes of accident comes from the employers themselves, but it must be remembered that under these circumstances an impartial report must be rare. The employer in most cases has to safeguard his own interests both with the insurance companies and the Factory or Mines Department, and even if the information which he was required to furnish was a good deal more explicit than it is we should still find those responsible influenced by the conditions which prevail to-day. This problem of industrial accidents is of much greater moment than is popularly supposed. It has been fairly accurately computed that accidents in industry cost this country some £2,000,000 per year, some of the headings under which this computation is made being the payment of compensation, clerical, legal, medical, and other

overhead charges due to the system under which compensation is payable, loss of output, and last, but not least, loss of morale amongst the victim's fellow workers. This opens up a further line of investigation. Apart from the actual amount of compensation paid no reliable statistics are available as to the incidental costs. I admit that this would probably entail very considerable labour, but I also submit that the problem is worth it. There also exists a demand for considerably more publicity in regard to the methods by which accidents can be prevented. So far the only two lines of approach have been by means of legislation and what might be called education through a "safety first" campaign. The legislative enactments dealing with this matter are easily referred to, but the methods by which success has been achieved in the other direction are generally wrapped in mystery. One of the means by which ASLIB could help seems to me to be by an appeal to all employers for information as to the methods they pursue. This appeal would have to be backed up by very strong persuasion and an indication that the information was being sought, not on a commercial, but on a human investigation. We in the National Safety First Association are only dealing with some 350 firms. There are at least an equal number of firms who are carrying out work without our assistance at all. We do not know who these firms are, still less do we know how their results compare with our own member firms, and yet there may be cases where much greater success is being achieved, and it is these instances on which the community, for its own good, requires information. With regard to statistics, I do not propose to say very much. It is probably known to all of you that an international statistical system has been considered by the International Labour Office, and on this system a number of private firms base their figures. It is, however, to be deplored that so far our own Government has not seen fit to present their figures on any basis by which they can be compared with any other nation. In fact, one might go so far as to say that in this country the figures furnished in the Government Reports are of no practical use at all.

Coming now to the final points, one would suggest that it is somewhat to our discredit that practically all the available information on this subject comes from the United States. The National Safety Council of America and various accident prevention organisations in Canada all publish not only monthly journals dealing entirely with this subject, but also very full verbatim reports of annual conferences, where much valuable information is brought out. Next to the American continent, Germany is the most fruitful source. We all know the very valuable scientific investigation work which that country has shown itself capable of, and they are now turning to this problem. From time to time expert investigators publish the results of their labours, and if in some cases these reports are almost too complete, they do at any rate contain much valuable information. In this country, apart from the Industrial Fatigue Research Board and the National Institute of Industrial Psychology, who have conducted some few investigations into specific industrial accident subjects, practically nothing has been done. It must be admitted that, as a general rule, the voluntary associations are hampered by lack of funds, but it does seem to me that, in view of the magnitude of the problem and the consequences to industry, there is need for the State to consider the matter in some form or other. Here again I admit that national finances have to be considered, but I do believe that if the State could devote, say, £10,000 a year to this problem, industry would benefit to at least tenfold extent. May I, then, leave the whole question with you for discussion. ASLIB can do, and will do, much valuable work in collecting and disseminating whatever information is available on this matter, but in addition to the service which ASLIB can render ways and means must be devised for enlightening the community as to the task which has been set, and it is only by open discussion of the matter that this can be thoroughly achieved.

DISCUSSION.

The following members took part: MR. B. M. HEADICAR, MR. W. H. WYNNE, MR. P. K. TURNER, MR. G. SHAW-SCOTT, MISS DU RECE, MR. T. J. TINGLEY and MISS A. L. LAWRENCE.

The Necessity for the Standardisation of Bibliographical Methods.

BY DR. S. C. BRADFORD,

The Science Library, Science Museum, South Kensington, S.W.

The continued existence of this large and flourishing Association of Special Libraries and Information Bureaux is sufficient evidence of the widespread desire for the discussion of problems that are common to the various aspects of the collection, treatment, and dissemination of information. It is unnecessary, therefore, to apologise for an attempt to contribute to the general theory of the economics of documentation.

Probably almost all those who are present at this Conference are interested in one way or another in the collection or supply of information. We realise the vast quantity of fact and theory that is being poured out in scientific, technical, and other periodicals, and we know that it is important for the success of the multifarious undertakings, with which we are connected, that data of special interest from our particular points of view should be selected from the immense mass of published material and made available for use. How best to achieve this result is a problem which concerns us all.

Before, however, we attempt to discuss the solution of this problem, it is desirable to try to gain some idea of the quantity of material to be dealt with. Mr. H. T. Pledge, Superintendent of the Reading Room in the Science Library, has undertaken to make a careful research. The complete results are not yet to hand, as considerable analysis is needed, but the calculations indicate that, excluding patent specifications, between a million and a million and a half scientific and technical papers are published each year.

As we are not content to allow the major portion of this tremendous volume of published information to run to waste for ever, we must study how to make it available. The problem divides naturally into two parts: I, The Collection, and II, The Indexing, of the Material.

The need for a central collection of every published scientific and technical periodical has been emphasised on a number of occasions. Many of the periodicals in which important papers are published are not filed anywhere in London, or indeed in this country. The Science Library is endeavouring, with an altogether inadequate purchase fund, to remedy the defect by attempting to make as complete as possible a collection of the scientific and technical periodical literature of the world, which will be available for free reference in the Library by the public, and for loan to research workers through approved institutions with which they are associated.

If the Science Library could be put in a position to complete its extensive collection of periodical literature, half of the problem we are considering would be solved. But a vast collection of books is of comparatively little use without a general index for discovering the volumes and pages on which are to be found the particular information

sought, and how to provide this index is the second half of the problem with which we are concerned. If I may quote the words of Sir Philip Cunliffe-Lister in the preface to the *Report of Proceedings of the First Conference on Information Bureaux and Special Libraries*, "The growth of knowledge during living memory has been remarkable and its application evident in every direction. Whilst it is generally recognised that 'knowledge is power' it is none the less true that a considerable proportion of accumulated knowledge, whether in the domain of science, business, sociology, education, or elsewhere, is unfortunately lying dormant and untapped.

"That this state of affairs prevails is much to be regretted. An immense amount of extremely valuable information is in existence, if only one knows where to find it. The volume of modern knowledge being far beyond the mental grasp of any individual or group of persons however erudite, it becomes a vital necessity to provide a master-key whereby this common storehouse may be unlocked.

"It is, therefore, with pleasure that I learn of the beginnings of a movement having as its object the co-ordination and systematic use of the many informational and library-services."

In the absence of such a master-key it is probable that more than fifty per cent. of scientific work and thought is wasted in useless repetition, and it is difficult to imagine the gain to mankind that would result from the provision of a comprehensive index to recorded information.

"Co-ordination" seems to me the solution of this part of the problem. For by co-ordination of bibliographical agencies the desired master-key can be provided. Since the need for indexing information began to be felt, multifarious individuals and institutions have applied themselves to the task, each one by the method that seemed to himself the best. That the result of so much unco-ordinated individual effort should be confusion is an economic necessity. Thousands of bibliographies have been compiled and many bibliographical periodicals issued; but nearly all of them are on different systems; the same articles have been classified over and over again, and only a small portion of the total literature has been indexed. Consequently, to find what papers have been catalogued as dealing with a given subject, it is necessary to ascertain what bibliographies have been issued on that subject, where they are, gain access to them, master the system on which each one is compiled, and then study each of the parts of which each volume may consist. Such a research may take several weeks or months, and in the end only a portion of the literature on the subject will have been found. In the Science Library a point has been made of collecting as many scientific and technological bibliographies as possible, and, with a view to making these more accessible, all those issued separately from other matter have been classified and gathered together into one place in the Reading Room for open-access. This has made it possible to prepare a careful estimate of the total number of separate bibliographical entries in the Library, excluding those published in, or in connection with, separate articles. The number works out at the colossal figure of forty million. This calculation, which was kindly made by Miss M. Gosset, B.Sc., Junior Assistant in the Science Library, is particularly interesting, because it shows that, in the past, the total

number of bibliographical entries made has been of the same order as the total number of scientific and technical articles written. So that, if bibliographical work had been co-ordinated, the same expenditure of energy would have sufficed to index every scientific and technical paper published. The estimate shows also that to index the total output of scientific and technical literature is not an impossible undertaking.

Nevertheless, at the present moment we have to deplore the fact that, in spite of this colossal expenditure of energy, we have nothing approaching a master-key to knowledge. However, the science of economics shows how to bring order out of this confusion. It suggests that those, who are now working independently in making separate indexes to published information, should agree to work together by standard methods. If many thousands of persons should attempt to drive to Epsom Downs, at a certain time on a certain day, in the way that seemed best to themselves, without any consideration for each other, there is no doubt that only a small number would ever get there. In order that all may arrive at the chosen destination, it is necessary to impose a minimum of control, which, though interfering slightly with individual liberty, yet allows of the attainment of the end that is desired by all. This is an illustration of the economic law that it is necessary for the individual to undergo the slight inconvenience of submitting to a minimum of regulation, so as to obtain the maximum benefit from the labour of the many. It is the principle which has come down to us through the ages in the familiar words "Unity is Strength."

The application of this law to the art of bibliography is very simple. The necessary regulation required is the adoption of a standard classification. A classification is like a language; in order to understand each other, bibliographers must use the same nomenclature. However, in the case of bibliography, the inconvenience of submitting to rule is very slight, while the advantages are very great. As Professor Pollard said in his paper read at the Seventh International Congress of Photography this year, "Individual attempts to devise schemes, whereby such material may be classified by subject, must necessarily be attended sooner or later with failure. The ramifications and inter-relations of matters, which can form the subject of an intellectual work, are so vast that no single mind can hope to deal with the problem of universal bibliographical classification. Even when such a classification has been attempted, by the concerted action of numbers of persons with specialised knowledge, imperfections become apparent in the scheme, which can only be minimised by constant and critical application." But by adopting a standard classification, the individual gets a scheme that embodies the accumulated experience of his co-workers. At the same time his work is made available for use by them and theirs by him. The application of the principle of co-ordination appears so obvious that it hardly seems necessary to emphasise it. A very extensive bibliography can be produced only by a number of workers using a common classification, and, if a large number of bibliographical undertakings should agree to use the same classification, their total bibliographical output would be unified immediately. It would be then possible for individual workers and associations to collect information on a given subject, from all sources using the

standard system, and intercalate it in one series in a single special bibliography of that subject for their own use, while, in very large libraries all such published bibliographies could be collected, and formed into one great repertory, in which all the references on a given subject would fall together automatically into one place, so that they could be found in a moment, with the saving of weeks or months of work at each consultation. From what has been said above, it follows that such a great repertory would cover a considerable proportion of the total output of scientific and technical literature. At the same time the enormous waste of energy, in the overlapping of bibliographical publications, would become so apparent that institutions would wish to take steps to obviate it. Thus, by adopting a standard classification, the bibliographical work of each individual would fit into one whole like the standardised parts of a machine, and the desired master-key would be attained.

The application in practice of the principle of bibliography by co-operation may be illustrated by the Information Service that has been organised at the Science Library. This service comprises :

(1) An exceptionally large and increasing collection of the scientific literature of the world, both books and periodicals, which is available for free consultation in the Library or for loan to Scientific Institutions and Research Associations in this country. (The Catalogue of books is in the form of a card-index only, but a list of current periodicals is available, price 1s. 3d. post free.)

The Library contains already more than 6,000 of the scientific and technical journals recorded in the "World List," and, together with the older series and those acquired subsequently, now possesses more than 8,000 such periodicals, which are being added to at the rate of about 1,000 periodicals annually.

(2) A comprehensive subject-matter card-index to papers in scientific and technical books and periodicals, to be used as a key to recorded information and for the supply of lists of papers on given subjects.

The subject-matter index is based on the fact that there are a considerable and increasing number of bibliographies, some of them very extensive, that are classified on a single system, which is the Brussels Extension of the Dewey Decimal Classification. This classification consists essentially of two parts : (i) a more or less logical detailed arrangement of subjects, each class being given a decimal number ; and (ii) a copious alphabetical index of subjects from which the class-numbers can be found without reference to the classification.

The new edition of the "Manuel de la Classification Decimale" will be published this year by the Imprimerie de l'Institut International de Bibliographie, Brussels, rue Piers, 101, at £2.

The Index entries are classified by writing, or printing, on each of them the numbers of the corresponding subjects in the classification, so that, when mounted on cards and put away in their places in numerical order in the index-drawer, all the entries relating to a given subject fall together automatically. Conversely, to find what information is available on a particular subject of inquiry, it is merely necessary to ascertain the classification number from the alphabetical index and look at the cards bearing that number.

Practically all the available scientific and technical bibliographical material that is classified by this system, amounting to more than

a million references, has now been gathered in the Science Library, and is being made available to readers. For those who are unable to visit the Library, lists of books and papers will be typed from the cards so far as the general work of the Library permits. Photostat copies of articles can be furnished on repayment. This great index is a practical example of the result of adopting a standard classification.

As I hope you will agree that it would be foolish to cast aside the teaching of economics and assert that chaos is preferable to order, we may pass on to consider which classification should be adopted as a standard. The answer to this question is emphatically "The Brussels Classification."

The question will, of course, be asked: "Why the Brussels Classification?" This classification may be very good for most subjects, but," the inquirer may say, "for the one in which I am most interested it is inadequate." A complete reply to this question would need a course of lectures with practical instruction, for there is a technique of classification, and it is impossible for anyone to select or prepare a satisfactory scheme for any subject without an expert theoretical and practical knowledge of both the subject of classification and the subject to be classified. As this combined knowledge is rare, the number of faulty classifications is multifarious.

Fortunately, however, the general principles of classification are simple, and a short outline of the subject can be given.

The answer to the second part of the question asked may first be stated, and is that, in all probability, the inquirer does not understand the Brussels Classification, and that, in any case the logical order and completeness of a section of a classification is a mere detail as compared with the principles on which the classification is based. It may be easy to add to, or re-arrange, the subject divisions of a classification, if these are really inadequate, but, unless the whole is drawn up on sound principles, the classification must be unsatisfactory.

Turning to the consideration of the general question, in such a master-classification as we need, a place must be provided for every subject of study, however special, and provision made for new discoveries and inventions. It would be necessary that the scheme for each special subject should be drawn up by an expert and afterwards submitted for criticism individually to several experts before being adopted. It will be seen that much that has been written hitherto on the subject of classification is irrelevant when applied to the indexing of the individual articles that are the primary records of original thought and investigation. We are told that the form of a classification should follow that of the order of ideas, history, or evolution. Its "function is to place a topic in its sequence in the order of knowledge in such a manner that books leading up to the topic are on the left of those dealing with it, and books leading away from the topic are on the right of them." Such an arrangement might have an advantage for readers "through the looking-glass" who would be expected to require books on any subject except the one of particular interest to them at the moment. But, in practice, the essential desideratum of a classification is that it should direct the reader to the books on the subject he wishes to study. The pundits appear to have regarded this proposition as too obvious to need

statement ; ignoring the practical test, they proceed to criticise each scheme according to the logical arrangement of its main classes, and, having dissected each existing classification by the laws of logic, they conclude, altogether erroneously, that the choice of a classification may be left to the predilection of the individual librarian. Such criticism is beside the mark. It matters not to a student whether the books on chemistry are arranged before or after those on geology, or if books on Ethics are placed between works on Logic and those on Systems of Philosophy, because the subjects are essentially different. The same remark applies even to the major subdivisions of a classification. It is only in the minor sub-divisions that it is useful to have books on subjects that are closely related placed as near as possible to those on the subject of inquiry. In short, it is wholly impracticable to have a bibliographical classification that will represent the best philosophical statement of the inter-relations of human knowledge ; no two thinkers would ever agree on the exact order of things, and, having made the best compromise, every year would require modifications and changes involving confusion and expense. The one important test of a classification is its utility ; it should be comprehensive, and as simple as possible to understand and use.

In considering the principles on which such a Classification should be based, we must recognise that what we classify are Things, and that Things have Attributes. The act of Classification is a mental process, in which we imagine that we have picked out all things that possess a certain Attribute, or set of Attributes, and put them together in a group by themselves. Such a group is called a class. But there are very many attributes that are common to a variety of things, and if we attempt to make a Classification by allotting a separate class to every possible attribute of every kind of thing, the size of the Classification would become enormous. It would indeed contain the extent of knowledge and include, besides, classes that are now imaginary but that may become real in future.

When the novice in the art of classification attempts to tabulate all the classes of a given subject, he sets himself a task of such an order of magnitude. And realising, subconsciously or otherwise, the impossibility of making the scheme complete, he is obliged to be content with a selection of what he considers to be the most necessary headings. Naturally almost every selection is different, and confusion inevitably results.

Now, although many writers have discussed the application of logic to the arrangement of the classes in such an elementary scheme, it was left to the lawyers MM. Otlet and La Fontaine, in 1899, to apply the laws of logic to the principles of classification itself, and the result was the Brussels Classification, which is therefore unlike any other scheme, being at the same time more simple and almost infinitely more comprehensive.

Let us suppose that we represent by x_1 a thing defined by a single attribute, or by a restricted set of attributes, let us say the substance sulphuric acid. Now, if we are classifying literature on sulphuric acid, we shall have to deal with many forms of books and papers in which this substance is treated from many different points of view. The literature of sulphuric acid is, in fact, a collection of things, any one of which may be represented by $x_1 m_1 n_1 p_1 \dots$, where $m_1, n_1, p_1,$

etc., indicate various attributes of the literature or of the substance sulphuric acid. For instance, there will be papers on theoretical or experimental studies relating to the manufacturing process, at the start, while in use, or after modification ; papers from the point of view of realisation of the manufacture, such as gathering materials, special operations, raw materials, accessory products, machines employed, fixed machinery, engines, machine-tools, implements, results obtained, by-products, fittings and apparatus ; papers from the economic point of view, such as cost of materials, labour, selling price ; from the point of view of premises, sites and personnel of various kinds. These and many other general points of view are common to the various branches of the sulphuric acid industry, as well as to a vast number of specific subject divisions. Again it will be necessary, in many cases, to classify bibliographical material according to place, time, or language, or, it may be, according to the form of the work. Thus sulphuric acid manufacture may need to be treated from the point of view of country or period, or it may be desired to distinguish between large treatises, manuals, books of tables, popular descriptions, collected papers, periodicals or historical studies.

It is obvious, therefore, that a classification, in which a separate class is allotted to each aspect of every conceivable subject division, would occupy many hundreds of volumes. On the other hand, by classifying separately, in various auxiliary tables, as many as possible of the attributes, m, n, p, that are common to a number of things, the size of the main classification of things, represented by x, is reduced to its smallest limit, and each class of the main classification can be sub-divided as required by the use of the auxiliary tables. This is the principle of the Brussels Classification, which is thus able to represent, in a single volume, almost every conceivable set of attributes in the universe.

In short, the decimal bibliographical classification of the Institut International de Bibliographie at Brussels comprises a vast systematic arrangement of subjects in which knowledge is classified with as much logical order as possible, proceeding from the general to the particular. In this main table, each subject is denoted by a decimal number, which fixes its position in the table, yet allows of the intercalation of any desired number of new sub-divisions without changing the order or numbers of the existing divisions. The main classification is capable of almost infinite extension by the employment of various auxiliary signs and tables representing points of view common to a number of subjects. The signs are given a definite order of succession, so that compound numbers may be filed in definite order with the simple numbers. The Brussels Classification is thus a powerful tool of bibliographical research worthy of universal recognition, and is at the same time the simplest and cheapest method of indexing that has ever been devised. The system is now rapidly gaining ground, and is used by more than 10,000 scientific and business organisations of all kinds in thirty-eight countries of the world.

There is no other classification that has been reduced to its simplest terms in this way, or that is capable of indexing the great variety and quantity of literature, in which the multifarious activities of mankind are recorded. There is, therefore, no other classification that could be adopted with success for an undertaking of this magnitude.

I appeal to all those who have at heart the progress of science and invention to unite in a common effort for unlocking the vast storehouse of recorded information for the benefit of mankind with a master-key formed by the use of the Brussels Classification for all bibliographical work.

DISCUSSION.

SIR HENRY LYONS, in introducing the paper in the unavoidable absence of Dr. Bradford, gave a brief summary of the objects and present position of the library at the Science Museum. He pointed out that the library shared in the financial handicap of the museum. The total sum available each year for new acquisitions was only £2,000 (a sum which had been unchanged since 1860-65), but the museum was looking hopefully for the possibility of relief when the Museums Commission made its report. Of the total £2,000 the library received three-fifths—*i.e.*, £1,200 a year. Other museums with large libraries usually had a much larger purchase grant and were able to assist the library limb more materially, but in the Science Museum the small fund meant that each limb tried to steal from the other, and there was nothing to steal. This financial position explained why the library had had to concentrate on periodical literature, and why the purchase of books was relatively small. Sir Henry Lyons explained how the contents of the library had been made available for loan. They were available to any worker provided that a recognised institution, association, or society would take the responsibility of ensuring their return by the reader. The scheme had been in operation some two years, and requests had been received from Germany and other countries, as well as from workers at home, but on the whole applications for loans had not been overwhelming. The scheme had therefore not proved either burdensome or impracticable. Such enquiries as had been received, however, had been the cause of some little trouble, because the enquiry was often spread over too wide a subject-area. That difficulty arose mainly because the Index to the Brussels Extension was not available at the moment. The last sections in French were now in proof form, but the fullest progress would not be made until we had an English translation, so that the individual worker could ask for entries under the minute sub-divisions which he really required.

The Chairman, MR. C. R. SANDERSON, in opening the debate, suggested that perhaps three points stood out very prominently in Dr. Bradford's thesis, and all three emphasised the fact that the same problems faced the specialist librarian and the general librarian.

The first point was the method of arranging index entries, and Dr. Bradford strongly urged that they should be arranged on the basis of an accepted scheme of scientific classification. Dr. Bradford argued mainly on the basis of periodical articles, but the same arguments could be used for index entries made for composite works, and it followed that they could be applied to all analytical entries for other works. Ultimately the problem therefore merged into that controversial question of the general librarian: "Classified" catalogue versus "dictionary" catalogue.

The second point was that the accepted scheme of classification should be Dewey and the Brussels Extension. Dewey was the most generally accepted basis in libraries in this country as well as in America, but very few even of the warmest friends of the scheme claimed perfection for it. Wherever one went one found that most people tinkered with the scheme in order to remove the more obvious defects, and possibly the only way to reach an unqualified acceptance of Dewey as the basis of our classifications was to adopt a suggestion which had frequently been made—namely, that a panel of experts should be set up to adapt Dewey to English requirements. It might be that Dr. Bradford was directing his arguments particularly to the scientific and technological sections of the classification, and it could well be argued that these were the best sections from an English point of view. But librarians whose special interests ran in other directions, and librarians of general libraries, did want something better than the present basic Dewey if we were to avoid making individual adaptations.

The third point was that if we adopted the suggestions in the paper our problem was solved. But it might be argued that the solution was incomplete unless provision was made not only for avoiding duplication, but also for some process of weeding. The absence of these provisions might result in placing an uneconomical burden on the user of a catalogue or index. It was true that some items were of value for all time; these would be brought out in bibliographies

again and again, and duplication would follow if the work were done merely automatically. Also for many articles there was merely a limited period of validity until the time-log of the printed book was made up; when the information in the article had been incorporated in some subsequent work, or had been superseded by some later investigation, it might be regarded as dead weight to be cut away. This, at any rate, was the problem which constantly faced many librarians, especially those whose libraries included enquiry services and who dealt with masses of what was called "fugitive material."

These three points showed how much special librarians and general librarians had to learn from each other; their joint experiences might go some way towards settling what had for a long time been highly controversial topics.

MRS. S. M. TRITTON said she was fully in agreement with the usefulness of the Brussels Extension, but there was need to stress the fact that the person responsible for the classifying should not only know the system thoroughly, but must also possess considerable scientific knowledge of the subject to be classified. Once abstracts or information had been indexed by the appropriate decimal number an unskilled person could collect and sort them, and the research worker was saved a tiresome search as well as the risk of missing important papers. In addition, cognate subjects that might at any time have a bearing on the research worker's special work could be found under the particular decimal number, and if the classifying had been carried out by an expert in this branch, the research worker could be sure that *all* the information (and this was probably more than he would find unaided) would have been accumulated under the appropriate decimal number.

DR. W. BONSER expressed regret that the Science Library was not more fully used. He suggested that the use might possibly be extended by a closer co-operation between Government Departments. If the Science Library would trust the Post Office, the worker might be enabled to get his material more cheaply instead of having to pay perhaps sixpence postage each way for a single periodical article. He suggested, secondly, that the standardisation of bibliographical methods should include the arrangement of the catalogue. At present it was extremely difficult to find one's way about the catalogue, whereas if the arrangement of the "World List" were adopted, reference to the catalogue would be much simpler. Also some indication might be given in the catalogue as to whether the "run" of each periodical was complete. If "imperfect" were added to such entries as indicated incomplete sets, the worker would often be relieved from any necessity of asking whether a particular issue was available.

MR. P. K. TURNER pointed out that although the up-to-date Index to the Brussels Extension was not yet available, there had been an Index in existence since 1906, and many copies were available in this country. It was true that details had changed with time and progress, and that particular numbers had been expanded perhaps a hundred times, but the basis of the scheme was available.

It ought to be recognised that a system which might be found admirable even for a large individual library might fail when we were trying to get a bibliographical index of all knowledge. In the latter case a reference number might run to seven or eight figures. That was not the kind of thing wanted on the back of a book in a library, and, indeed, it was not necessary that the public should understand it; library index *must* be handled by a skilled person.

One suggestion he wished to put forward, but with very great diffidence. It was that the value of the index would be enormously increased if an abstract of even a few words were added to the entry; some indication might possibly be made as to whether the item was the product of new research, whether it was a popular exposition, etc. This would mean an enormous increase in the task of compilation, but it would be a still greater increase in the value of the index.

MR. B. M. HEADICAR said the greatest difficulty to be faced was not the application of any particular notation, but the putting of knowledge into people's heads as to how to classify the subject itself. We must therefore first educate in the art of classification before we educate in the art of applying any particular classification. It must also be remembered that the outlook in different libraries was necessarily very different, and, therefore, whatever classification we might adopt, standardisation was extremely difficult. It should, for example, be remembered that the Library of Congress, which had Dewey at hand, had nevertheless decided that it was unsuitable in its then form. Similarly, the library at the London School of Economics had followed the Library of Congress because that classification was more up to date, more detailed, and was available in English, or at any rate in American.

DR. L. T. THORNE wished to thank Sir Henry Lyons for making the collection of periodicals available as a lending library. It would be of inestimable value to a very large number of workers, and any lack of use at the present moment was due to the difficulty of making such a great advance generally known. The more that knowledge could be spread the fuller would be the use of the library.

MR. A. JACOB DUNDAS suggested that the best time of action in standardisation was to take what had already been done in classification and indexing, and see where the general consensus of opinion lay, otherwise future generations would still be discussing the relative merits of different systems. We had to settle on one method or another; none was perfect, and we should therefore see which method had been most universally applied and adhere to that one.

The Aslib Directory.

MR. A. B. HYSLOP, Treasurer of the Carnegie United Kingdom Trust, in the absence of Lieut.-Colonel J. M. Mitchell, made a brief report on the ASLIB Directory, published on May 31st, 1928.

He said that since publication 360 copies of the Directory had been sold, 280 by the Oxford University Press and 80 direct through ASLIB. There had been a free distribution of 733 copies, 373 to members of the Association, 11 complimentary, and the remaining 349 copies had been distributed by the Carnegie United Kingdom Trust to all County Libraries and to the Public Libraries of towns with ten to fifty thousand inhabitants. With regard to this last distribution, Mr. Hyslop explained that when the Trustees made themselves financially responsible for a publication they invariably made it available without charge to all persons interested in the subject dealt with. In the case of the ASLIB Directory there had been a compromise. This free distribution to certain libraries had been made, but the Trustees had agreed that no further free copies should be supplied, at all events at their request, so that the Association might reap as much benefit as possible from the sale of the Directory. On the whole, the sales of the Directory were very satisfactory, and orders from America had yet to come in.

The Directory had had a good press, some of the reviews containing helpful criticism and nearly all expressing appreciation of its usefulness.

Mr. Hyslop then mentioned some of the suggestions and criticisms that had been received since publication, one being that, in a future edition, information as to the number of volumes (failing expert knowledge of the collection) should be insisted upon, if an entry was to appear, and that a scale should be prepared showing, under each subject, the minimum number of volumes entitling a collection to special notice. This, it was suggested, would prevent the submerging of a real special collection by the spurious ones. Another suggestion was that the location section should refer the reader to the subjects under which each library appeared as at present there was no connection between the location entry and the various subject entries. A similar proposal had, as a matter of fact, received the consideration of the Editorial Board before publication, but owing to the unavoidable delay in the preparation of the Directory and the extra amount of work and expense this would have involved, it was not considered feasible at the time. It had also been suggested that the inclusion of bibliographies under the subject entries would be very helpful, but this also had been considered and rejected as making the book too bulky. The same objection might possibly apply to another suggestion that the foreign press should be included. The heavy expense of including such additional matter would be a serious item, and in this connection Mr. Hyslop mentioned that the cost of preparing and printing the present edition had amounted to about £3,000. Other criticisms received were that in some instances the headings chosen were extremely wide—e.g., "archæology," "commerce," "women," while others, such as "ball bearings," "stokers, mechanical," "weighing machines"—were decidedly specialised. Again the title of the Directory had come in for a certain amount of

criticism, this being regarded as ambiguous, difficult to classify appropriately in a catalogue and not likely to indicate its contents to potential buyers. Mr. Hyslop remarked with regard to this criticism that his suggestion was that ASLIB only had to become well enough known for such a title to need no explanation.

A good deal of additional information had been received since publication, and was available to members on application to the offices of the Association. This included information, for example, on glass, films, metallurgy, explosives, Essex birds, etc.

The Carnegie United Kingdom Trust had been anxious that a cheap edition of the Directory should be available to *bona fide* students of librarianship. It had been agreed, therefore, by the Council of the Association that copies of the Directory in a cheap binding should be on sale to students at 10s. 6d. This offer was for a limited period only, and would be kept open until the end of October.

In throwing the meeting open to discussion Mr. Hyslop said that constructive criticism would be welcomed by the Editorial Board.

MR. P. K. TURNER mentioned the difficulties that had confronted the Editorial Board, and said that many useful suggestions had had to be turned down owing to pressure of space and considerations of expense; indeed, it was only after a considerable struggle that it had been decided to include the English press. He hoped each member of ASLIB would look through the entries in which he was interested and see in what way his own subjects could be improved.

MR. F. D. KLINGENDER suggested that members should follow his practice, which was if on using the Directory he found an important omission in any subject or got to hear of any new source of information, to note this down on index cards which would be sent at intervals to ASLIB for their use.

MR. N. PARLEY expressed his appreciation of the help he had already received from the Directory. On the two subjects on which he had consulted it—"Alchemy" and "Printing Ink"—he had found really valuable information. With regard to "Printing Ink," there was one real authority on the subject, and that authority was given in the Directory. He had also been able to give an expert on "Alchemy" particulars of information of which he had not hitherto known the existence. As far as he was concerned, he was, at present, unable to add anything to the information already contained in the Directory.

MR. B. M. HEADICAR appealed to members to notify any omissions with regard to the press entries, which were of the greatest value. It would be particularly helpful to have papers of a semi-public character, bulletins, etc., brought to the notice of the Editorial Board.

MR. G. W. KEELING endorsed Mr. Klingender's suggestion of a card index of additional information.

MR. F. E. SANDRY suggested that the quality, not the quantity, of entries was to be aimed at, and mentioned the important point emphasised by Mr. Parley, who had been directed to *the* expert on a certain subject.

MR. E. T. ELBOURNE considered an index to the subject section might be inserted in another edition.

DR. R. S. HUTTON said that the Directory was a very serious liability to the Association, and that there was an obligation on members to support it in every way in order to ensure continuity in the collection and filing of further information. He himself had kept a note of new sources of information that came to his notice daily, and he was surprised at the number he had collected in a very short time, perhaps not all of them worthy of inclusion in the Directory, but all of them certainly worthy of keeping on slips in the office for the use of members.

MR. S. K. JONES suggested that librarians might look through the Directory, note the collections already mentioned, and add particulars of any collections of their own on these subjects which it had not occurred to them to mention individually when returning information for the first edition.

MR. E. W. HULME said he also was anxious to emphasise the fact that members and librarians should send in additional matter regarding their own collections or new sources of information. This was particularly the case with regard to collections in private possession regarding which this edition had only just begun to break the ground.

Final Session

At the final Session of the Conference the chair was taken by BRIGADIER-GENERAL MAGNUS MOWAT.

MR. J. G. PEARCE, Chairman of the Council, who was unable to remain until the end of the proceedings, spoke briefly to the delegates before leaving. In announcing his intention to resign the position of chairman, he said that the reasons which had been urged upon him last year why he should continue in this office were no longer applicable. The Incorporation was completed and the Directory was published. Domestic reasons forced him to seek relief from some of his work, and he felt, more strongly than ever, that the office was one which should rotate in order that the Association might have the benefit of the varied experience which was represented on the Council. BRIGADIER-GENERAL MAGNUS MOWAT moved a resolution of thanks to Mr. Pearce for all he had done for the Association since its formation. The delegates made clear their appreciation of Mr. Pearce's services by the enthusiasm with which the motion was carried.

RESOLUTIONS FROM SECTIONAL MEETINGS.

The CHAIRMAN announced that a number of resolutions had been received from Sectional Meetings for submission to the General Session. If these were approved they would be passed to the Council for consideration and necessary action. The resolutions, having been spoken to by their movers and seconders, were discussed briefly, and in each case it was agreed to refer them to the Council. The resolutions were as follows :

1.—That the attention of the Carnegie United Kingdom Trustees be called to the desirability of compiling at an early date a Union Catalogue of London Borough Libraries and the Guildhall Library, as recommended by the Departmental Committee on Public Libraries, and that the Trustees be asked to consider the financing of such a catalogue at an estimated total cost of £1,000 a year for five years.

Proposed by DR. BAKER, *seconded by* MR. BERWICK SAYERS.

2.—To ask the Council of ASLIB to consider the possibility of publishing a periodical list of current scientific and technical books at intervals not longer than quarterly, with critical evaluations.

Proposed by MR. F. E. SANDRY, *seconded by* MISS M. GILBERT.

In regard to these two resolutions it was agreed that the Council of the Library Association should be consulted before action was taken.

3.—That the Council appoint a special committee to investigate and report upon practicable and economic methods of improving the indexes and lists of contents in scientific and technical journals.

Proposed by DR. TRIPP, *seconded by* MR. SHEPPARD.

4.—The Association of Special Libraries and Information Bureaux (Great Britain), agreeing that the present position as regards deterioration of documents and printed matter in public Record Offices and Libraries threatens to become extremely grave, and that practical steps might be taken without serious difficulty to remedy this situation :

Hereby expresses its emphatic approval of the resolutions and recommendations of the Committee of Experts, approved by the International Committee on Intellectual Co-operation, at Geneva, August, 1928, *viz.* :

“ That the attention of Governments (should) be drawn to the necessity of using for documents (and printed matter) of permanent value, and especially

for those of an official character, only papers manufactured according to (given) specifications.”

In support of the foregoing it is further resolved that H.M. Government be asked to consider the establishment of a public testing station or public Standardising Committee for the purpose of fixing standards of durability for papers and other writing materials, and of publishing information on this subject with a view to the wide adoption of approved materials for manuscripts and printed matter of permanent value :

And to consider the advisability of enforcing by Statute the printing of books, etc., destined for the Copyright Libraries on paper of approved durability.

Proposed by MR. PARLEY, seconded by MR. MCADAM.

5.—That this meeting desires to impress upon the Government the need for an inquiry into the working of the Patents Acts in relation to the industries of the country and the relief of unemployment.

Proposed by DR. THURSTON, seconded by MR. TURNER.

In regard to this resolution it was agreed that the Industrial Conference should be consulted.

On the proposal of BRIGADIER-GENERAL MAGNUS MOWAT the best thanks of the Conference were accorded to the Warden and Fellows of New College for their permission to hold the Conference there. Votes of thanks were passed also to the Junior Bursar and the College staff ; the staff of ASLIB ; and to Miss F. Marks for her kindness in providing entertainment for the delegates.

The proceedings of the Conference then ended.

Report of the Third Annual General Meeting.

The Third Annual General Meeting (first since incorporation) of Members and Associate Members was held at 5.30 p.m. on Saturday, September 15th, 1928, in the Hall of New College, Oxford.

Present : 94 Members and Associate Members were present.

Chairman : Mr. J. G. Pearce, Chairman of the Council of the Association, acted as chairman of the meeting.

AGENDA.

- 1.—Minutes of the Second Annual General Meeting, held at Trinity College, Cambridge, on September 24th, 1927.
- 2.—Audited Statement of Accounts for the year ended June 30th, 1928.
- 3.—Re-election of Auditors.
- 4.—Election of Council.
- 5.—Election of Officers.
- 6.—Other Business (if any).

ITEM 1.

The minutes of the Second Meeting, having been circulated, were taken as read. On the motion of Mr. E. W. HULME, seconded by COLONEL E. L. JOHNSON, they were confirmed and signed as correct by the Chairman.

ITEM 2.

The audited Statement of Accounts had been circulated. On the motion of Dr. E. E. LOWE, seconded by Mr. A. MARKHAM, they were received (see page 127).

ITEM 3.

On the motion of Mr. G. SHAW-SCOTT, seconded by Mr. JOHN WARNER, it was resolved unanimously that Messrs. West and Drake be re-appointed auditors to the Association.

ITEM 4.

Before proceeding to the election of the Council, the CHAIRMAN referred to the death of Mr. Leon Gaster, and spoke of the work which he had done for the Association. He reported that a nomination had been received to fill the vacancy on the Council: Mr. F. W. Smith, nominated by the Association of Supervising Electrical Engineers. In the absence of other nominations, it was resolved unanimously, on the motion of Mr. H. ROTTENBURG, seconded by Mr. A. R. BARNES, that the Council be re-elected as follows :

- J. G. Pearce, M.Sc., M.I.E.E., British Cast Iron Research Association.
P. K. Turner, M.I.E.E., M.I.R.E., Graham Amplion, Ltd.
Brig.-General Magnus Mowat, C.B.E., M.Inst.C.E., M.I.Mech.E., Institution of Mechanical Engineers.
Miss A. L. Lawrence, M.B.E., M.A., LL.B., British Medical Association.
F. W. Clifford, F.L.A., The Chemical Society.
Percy Cohen, Conservative and Unionist Central Office.
A. P. M. Fleming, C.B.E., M.Sc., M.I.E.E., Metropolitan-Vickers Electrical Co., Ltd.
H. Vincent Garrett, Rowntree and Co., Ltd.
Sir Richard Gregory, D.Sc., F.Inst.P., F.R.A.S., British Science Guild.
B. M. Headicar, F.L.A., London School of Economics and Political Science.

L. Honeyburn, Imperial Chemical Industries, Ltd.
 E. Wyndham Hulme, B.A. (late Librarian, Patent Office).
 R. S. Hutton, D.Sc. (Director, British Non-Ferrous Metals Research Association).
 Colonel E. L. Johnson, Cleveland Scientific and Technical Institution.
 Colonel Sir Henry G. Lyons, D.Sc., F.R.S., The Science Museum.
 Lieut.-Colonel J. M. Mitchell, O.B.E., M.C., M.A., Carnegie United Kingdom
 Trust.
 Lieut.-Colonel L. Newcombe, T.D., F.L.A., Central Library for Students.
 A. F. Ridley, F.L.A., British Non-Ferrous Metals Research Association.
 F. W. Smith, Association of Supervising Electrical Engineers.
 Major L. F. Urwick, O.B.E., M.C., M.A., Management Research Groups.
 G. B. Willey, A.R.S.M., F.I.C., Hadfields, Ltd. (Research Department).
 J. C. Withers, Ph.D., British Cotton Industry Research Association.

ITEM 5.

On the motion of Mr. A. MARKHAM, seconded by Mr. T. J. TINGLEY, it was resolved unanimously that Brig.-General Magnus Mowat be re-appointed Honorary Treasurer and Miss A. L. Lawrence Honorary Secretary.

ITEM 6.

A short discussion took place as to the location of next year's Conference. On the CHAIRMAN asking for a show of hands, all but two or three members voted in favour of one or other of the older Universities.

MISS A. L. LAWRENCE, Chairman of the Conference Committee, answered questions regarding the Conference programme, and a number of suggestions were received for reference to the Conference Committee.

This concluded the business of the meeting.

ASSOCIATION OF SPECIAL LIBRARIES AND INFORMATION BUREAUX.

Dr.

BALANCE SHEET - 30th JUNE, 1928.

RECEIPTS.			PAYMENTS.			Cr.	
£	s.	d.	£	s.	d.	£	s.
To Sundry Creditors	...	...	By Cash at Bank	...	...	649	2
" Subscriptions in Advance	...	...	Less Cash in hand overdrawn	...	...	2	10
" Working Capital, as at July 1st, 1927	...	...				7	
Add Balance of Income and Expenditure Account 220 16 1			" Sundry Debtors for Directories sold	...	...	646	11
			" Furniture and Fittings	...	...	138	10
						50	0
						835	1

Dr.			INCOME AND EXPENDITURE ACCOUNT			for the YEAR ENDED 30th JUNE, 1928.			Cr.	
£	s.	d.	£	s.	d.	£	s.	d.	£	s.
PAYMENTS.			RECEIPTS.							
To GENERAL EXPENDITURE—			By GENERAL RECEIPTS—							
Salaries	...	...	Grant from Carnegie U.K. Trust	...	...	500	0	0		
Rent, Heat, Light, and 'phone	...	...	Membership Subscriptions	...	...	618	9	0		
Printing, Stationery, Postage, and Office Expenses	...	...	Donations	...	...	14	4	0		
Travelling Expenses	...	...	Directory Sales	...	...	170	1	6		
Subscriptions	...	...	Bank Interest	...	...	16	6	1		
Press Cuttings	...	...				1319	0	7		
Audit Fee	...	...	" CONFERENCE RECEIPTS—							
			Fees	...	...	362	5	6		
" COST OF 1927 CONFERENCE—			Sale of Reports	...	...	24	12	9		
Conference Expenses	...	...	Advertisements in Report	...	...	39	9	6		
Printing of Conference Report	...	...				426	7	9		
			" DIRECTORY RECEIPTS—							
" DIRECTORY EXPENDITURE—			Grant from Carnegie U.K. Trust	...	...	500	0	0		
Salaries	...	...								
Rent, Heat, Light, and General Office Expenses	...	...								
" PRELIMINARY EXPENSES OF INCORPORATION										
" Balance carried to Balance Sheet...										

We have audited the above Balance Sheet and have obtained all the information and explanations we required. In our opinion such Balance Sheet is properly drawn up so as to exhibit a true and correct view of the Association's affairs according to the best of our information and the explanations given to us and as shown by the Books of the Association.

July 23rd, 1928.

8, New Court, Lincoln's Inn,
London, W.C.2.

(Signed) WEST AND DAKE, Chartered Accountants.
(Signed) J. G. PEARCE, Chairman.
(Signed) MAGNUS MOWAT, Hon. Treasurer.

* Reports from Foreign Organisations.

HAMBURGISCHES WELT-WIRTSCHAFTS-ARCHIV
(ZENTRALSTELLE DES HAMBURGISCHEN KOLONIAL-INSTITUTS).
Hamburg 36, Poststrasse 19.

OBJECTS.

The "Hamburgisches Welt-Wirtschafts-Archiv," established by the State of Hamburg, is a scientific institution in close connection with the University of Hamburg, the objects of which are to research for, to accumulate, and to utilise material dealing with the economical and political development of all countries, taking into special consideration those of vital importance for the German trade and commerce. The establishment of extensive economic archives, the publication of the weekly economic review "Wirtschaftsdienst," as well as other undertakings, serve this purpose.

THE ARCHIVES AND THE LIBRARY.

I. THE ARCHIVES consist of the "Länderarchiv" containing material giving general information about all the countries, and of several special archives. They contain mounted and filed clippings from about 50 German and foreign newspapers and periodicals, the increase of which numbers daily about 1,100, annually 350,000. The archives of private and public undertakings and organisations and those of market quotations contain also private publications, etc., supplied as issued.

1. *Allgemeines Länderarchiv.* In these archives, dealing with the countries in general, there are more than 1,500 subject sub-divisions for each country. The material affords up to date information on economics and politics, as well as on ethnology, ethnography, legislation, etc., especially on countries economically less developed.

2. *Firmenarchiv.* These archives comprise more than 16,000 files of private undertakings, commercial and industrial organisations, institutes, scientific, religious, and political associations, etc., of all parts of the world. Prospectuses, statutes, annual reports, clippings, propaganda publications, etc., give details of their work. Supplementary collections contain material on exhibitions, fairs, and congresses.

3. *Warenarchiv.* The archives of the various products contain clippings on raw materials and wares, filed alphabetically and according to the countries, with sub-divisions for local production, trade, etc.

4. *Marktberichtsarchiv.* The main divisions of these archives of market reports deal with commodities, money, stocks and shares, freights, and realty. The groups of wares and the wares themselves, arranged according to countries and market places, form the sub-divisions. Market reports from official and private sources, as well as those taken from the press, are each filed separately.

5. *Personenarchiv*. The archives of personalities deal with leading persons in politics, science, economics, and of the press. The clippings are arranged alphabetically.

6. *Pressearchiv*. These archives comprise more than 6,000 files containing specimen copies of newspapers and periodicals of all countries, as well as clippings, etc., dealing with the various organs.

II. THE LIBRARY contains about 30,000 volumes and 8,000 brochures, mainly for research work, and books of reference on all countries and subjects. Official memoranda budgets, reports of official departments, chambers of commerce, and consulates, parliamentary proceedings, statistical yearbooks, statistics on trade and produce, codes of law, custom tariffs, standard and periodical works of reference on countries, on branches of industry, and commodities, trade directories, etc., are to be found, finally, dictionaries, and all sorts of bibliographical works of reference. Approximately 2,500 newspapers and periodicals of all countries are taken in for the reading-rooms.

UTILISATION OF THE COLLECTIONS.

I. FREE PERUSAL in the public reading-rooms for everyone genuinely interested. To a limited degree verbal and written information is given.

II. PUBLICATIONS.

1. "*Wirtschaftsdienst* (Weltwirtschaftliche Nachrichten)" a weekly review, published jointly by the "Hamburgisches Welt-Wirtschafts-Archiv" at the University of Hamburg with the "Institut für Weltwirtschaft und Seeverkehr" at the University of Kiel, since 1916. Its regular features include critical essays, periodical reports on countries, economic reviews on all parts of the world, business reports, and statistics.

2. "*Hamburgische Forschungen*" (Research work on economic and political questions affecting Hanseatic spheres of interests), edited by Geh. Regierungsrat Prof. Dr. Franz Stuhlmann. Published by Georg Westermann, Braunschweig-Hamburg. The following 10 volumes have been published since 1916:

1. Stuhlmann, Franz: Der Kampf um Arabien zwischen der Türkei und England.

2. Seligmann, Otto: Die künftigen Handelsbeziehungen zwischen Russland und Skandinavien.

3. Deumer, Robert: Das Hamburgische Hypotheken-Kreditwesen.

4. Dove, Karl: Afrikanische Wirtschaftsstudien. Die natürlichen Grundlagen des Wirtschaftslebens in Südafrika. Die Wasserkräfte Afrikas.

5. Holländer, Albert: Die Einwirkung des Krieges auf überseeische, vor dem Kriege abgeschlossene Abladegeschäfte.

6. Konow, Sten: Indiens Bedeutung für England.

7. Plaut, Theodor: England auf dem Wege zum Industrieschutz.

8. Matthies, O.: Die ständigen Schiedsgerichte des Hamburger Grosshandels.

9. Bitter, W.: Die Eroberung Mittelamerikas durch den Bananentrust.

10. Franke, O.: Die Grossmächte in Ostasien von 1894 bis 1914.

3. "*Auslandswegweiser*" (Guide for Foreign Countries), edited by the "Hamburgisches Welt-Wirtschafts-Archiv." Published by L. Friederichsen and Co., Hamburg 1. The following seven volumes have been published since 1919:

1. Argentinien. 2. Gesundheitlicher Ratgeber für Auswanderer. 3. Natur und Lebensbedingungen in tropischen und tropennahen Gebieten. 4. Brasilien. 5. Mittelamerika. 6. Venezuela. 7. Südafrika.

4. "*Nachschlagebuch der Nachschlagewerke für die Wirtschaftspraxis*" (Guide to Reference Works for practical economic use). Appendixes : 1. Index of important economic periodicals of all countries. 2. Memorandum : The Hamburgisches Welt-Wirtschafts-Archiv. Edited at the instigation of the Hamburgisches Welt-Wirtschafts-Archiv, by Dr. Paul Heile. First edition, 1925. Publisher : Wirtschaftsdienst G. m. b. H., Hamburg 36. (In commission : Walter Bangert.) Price Mk. 5.—.

* This Report and the three others which follow have been communicated by foreign organisations, associated with ASLIB, which were unable, this year, to send representatives to the Conference.

During the Conference a letter was received from the Special Libraries Association of the United States, and a telegram from the American Library Association sending greetings to the delegates and good wishes for the success of the Conference.

REPORT FROM M. P. OTLET ON BEHALF OF L'INSTITUT INTERNATIONAL DE BIBLIOGRAPHIE.

The chief events of the year concerning L'Institut International de Bibliographie activities are the following :

1.—The preparation of the new edition of the Decimal Classification has been actively continued. At the moment 1,100 pages and two columns have been printed and partly distributed to the subscribers. (These already number over 800.) Part 66 (Chemical Industry) has been reached. It is hoped to finish the printing by the end of the year. There will be more than 50,000 divisions. An effort has been made to include the headings for classifications of Letters Patent and for the large international classifications of sciences.

2.—The Deutsche Normen Ausschuss, the German organisation for normalisation, is prepared to undertake, in agreement with the Institut International de Bibliographie, a translation of the Decimal Classification tables. At the Göttingen meeting the Association of German Librarians passed a resolution in favour of this translation.

3.—Conversations have taken place at Brussels (Institut International de Bibliographie) and at London (Science Library) with Mr. Dewey with a view to unification of the French and English editions of the Decimal Classification and the immediate issue of an alphabetic index in English of the French tables.

4.—Negotiations have been entered into with the American Library Association in order to get the co-operation of this organisation in the work and direct management of the Repertoire Bibliographique Universel for a period of five years. According to the latest information the suggestion has been favourably received by the American Library Association and the conditions are at present being discussed.

5.—The International Institute is still trying to secure definite headquarters which shall be permanent in spite of minor changes as regards premises occupied. An enquiry on this subject has been made to the groups interested. The negotiations have been opened in view of a transfer to Geneva when the Library, for which Mr. Rockefeller, jun., has given two million dollars to the League of Nations, is established in that town.

6.—With reference to this library the Institut International de Bibliographie has submitted a memorandum with a view to the establishment of a real World Library of general collections and not only an administrative Library for the League of Nations.

7.—The 1928 International Library Conference will take place on September 17th and 18th at Cologne, when the big Press Exhibition is open. The Germans have recently taken great interest in the work of the Institut International de Bibliographie. Attention is drawn to the fact that the Borsen Verein of Leipzig and the Deutsche Bucherei will be represented at the Conference for the first time.

8.—In Great Britain the British Association for International Bibliography has been established. It acts for the interests of the Institut International de Bibliographie in the United Kingdom. Its President, Mr. Pollard, has been nominated president of the Institut International de Bibliographie.

9.—All information regarding the Institut International de Bibliographie has been collected in a publication (No. 155) with the title "L'Institut International de Bibliographie, 1928."

SECOND REPORT ON THE COMMISSION INTERNATIONALE DE LA CLASSIFICATION DECIMALE (CC).

By F. DONKER DUYVIS,
Honorary Secretary.

Since I submitted my former report* the preparing and printing of the sections of the international code of decimal classification on engineering sciences have been taken to hand.

The same process was followed as in the case of the pure sciences. The advance manuscripts were prepared by the Secretary with the help of the Dutch Institute of Documentation, and subsequently submitted to specialists for criticism. The proofs were not only corrected by the Secretary of the CC, but also by the General Secretariat (specially with a view to French language), by Dr. S. C. Bradford and his staff (with a view to the general scientific contents), and finally in most cases by the specialist who had given his help in preparing the manuscript.

In extending the engineering sections I am specially indebted to Dr. Alingh Prins (president of the Dutch Patent Office) and his staff, of which the chief classifier, Mr. Santhagens, did a lot of important translation work.

Neither in the old Brussels edition nor in the American edition the principles of structural and functional classification were clearly distinguished by the editors.

Since the conference of directors and presidents of patent offices had expressed the wish that the international decimal classification should be put in a form adaptable for patent classification, it was necessary to give the engineering sections full development according to the lines of structural classification, whereas in the technological

* Report of the Proceedings of the Fourth ASLIB Conference, 1927, p. 60.

sections the functional aspect will prevail to permit the classification of technical topics from an economic point of view. The execution of this scheme required a strong development of the chapters of mechanical and electrical engineering, in which all elementary mechanical and most of the physical apparatus and processes had to be enumerated.

For several parts of mechanical engineering Mr. Vermandel, one time editor of the "*Revue de l'ingénieur*," gave not only his good advice, but even was so kind to come and stay several months in Deventer (the office of the CC secretariat) in order to assist in the executive work.

It appeared desirable to introduce an analysis of mechanic elements which are common to most mechanical constructions. In the special rubrics of mechanic engineering large space has been reserved for all kinds of rotative machines (pumps, motors, steam engines, etc.) with a view to their increasing future importance. Important use was made of the work of Mr. Bourrel, of the "*Société des Transports en commun de la Région Parisienne*," in order to extend the classification of internal combustion motors. Prof. von. Hanffstengel, of Charlottenburg, gave his help in the development of the section on handling materials. Experts of the Royal Dutch gave their advice in revising the classification of lubrication and of transport of liquids. Electrical engineering badly needed expansion and some revision. My collaborator, Mr. Vos, drafted a scheme based on reports of Mr. Beinet of the "*Revue générale de l'électricité*", Mr. Bourrel of the S.T.C.R.P., Dr. Clark of the Science Library, Mr. Clason of Philips works, Dr. Manders of the Patent Office, and on a scheme of the *Verband deutscher Electrotechniker*. Mr. Blondin, editor of the said French review, was so kind as to execute the correctional work.

The fundamental alterations were the concentration of all rubrics on electrochemical engineering in one section, the introduction of a separate chapter on television (with a view to future development of this subject), and the reservation "in blanco" of a whole chapter for future expansion.

In matters of mining engineering it was difficult to bring in concordance the German and Anglo-Saxon points of view, which were represented on one hand by Dr. Tvers, of Freiberg University and on the other hand by Prof. van Es, of Delft University; a small committee of experts of the last university amalgamated the various proposals.

The chapter on military and naval engineering was fundamentally extended in so far as all kinds of weapons of destructive engineering are to be classed there (also for peace purposes). Ltnt. Schoonenberg, of the artillery works of Hembrug, gave his collaboration.

In the former editions of the codes a general section for civil engineering was lacking, and, of course, it had to be introduced. Mr. van Gendt (Director of Public Works, Deventer) gave his attention to this matter.

In developing locomotive engineering use was made of the classification of naval architecture drafted by Mr. Limburg, of the Koninklijke Paketvaart Mij., and of the aeronautic classification of the Royal Aeronautical Society and the Fokker Aeronautic Works. Since locomotive apparatus on land, on water, and in the air show a lot of

common topics, an exhaustive chapter for general locomotive engineering was created.

In preparing the agricultural section the institute is indebted to the International Institute of Agriculture, where Dr. Hodgson and his collaborators did the bulk of the work. Dr. Kooiman, of Wageningen University, revised the dairy section. Mr. Steketee corrected the agricultural engineering section, which was rather neglected in the Brussels and American editions. Messrs. Lambert and Olie, respectively of the Paris and Utrecht Fishery Research Stations, treated the fishery section.

Miss Reading, of the Science Museum, made several important improvements to the general structure of the agricultural scheme.

The extension of the chapter on domestic economy was almost entirely based on the classification of the Dutch Patent Office.

Accountancy was extended under the supervision of Professor Limperg, of Amsterdam University and Mr. Keegstra, of the Dutch Efficiency Institute.

The management sciences were brought in concordance with the American edition and extended by the Dutch Efficiency Institute specially with a view to industrial psychology. Up to now about 1,200 pages of the classification have been printed. At present I am engaged in the section on chemical engineering, for which Mr. Vincent, of the Société de Chimie Industrielle, promised his help.

Although in many cases it was possible to obtain experts to help in preparing the work, it was inevitable that a lot of small sections had to be treated without outside help. As a matter of principle this is wrong, and so I consider the work done to a certain extent to be provisional. As soon as the work will have been published it will be possible to draw a greater number of experts into the scheme of organisation.

I succeeded in avoiding disagreements with the American edition in most of the sections, except in the rubrics 621.1/4 and 629.13, which deal with various mechanical and electrical subjects. In the other chapters of engineering and technology it will probably be possible to avoid discordances.

Since I took care that all topics dealt with in the recent German and Dutch patent classifications should appear also in decimal classification (although in another succession), it may be presumed that it will be possible to utilise the new edition for the classification of patents.

How far the international classification may be utilised for arranging economic and statistical data and customs tariffs is now being studied.

REPORT FROM THE NOTGEMEINSCHAFT DER DEUTSCHEN WISSENSCHAFT.

BY DR. JURGENS.

Since 1920 the "Library Committee" of the Notgemeinschaft has endeavoured to procure as much foreign scientific literature as possible for German libraries in order to make research work in Germany easier.

The most important part of this literature has still to be obtained by purchase, and the Library Committee makes use of its special position with close relations with all countries for this purpose. We may indeed hope to obtain the largest part of the scientific literature of foreign countries, because with this end in view we have made certain agreements with a large number of the German central libraries on science. These libraries must spend a part of their available means on special literature; for instance, Göttingen University library has the care of Anglo-American literature; Bonn University, the "romanisch en Kulturkreis"; Keil University, the Scandinavian Kulturkreis; Breslau University, Slavonic literature; Leipzig University, Italian literature and Orientalism; Tübingen University, theology and Orientalism; Königsberg University, philosophy; Heidelberg University, archæology and the history of art.

We still have, however, a great difficulty in estimating the real value of a book, not so much in connection with these special collections, but so far as it concerns our endeavour to obtain the most important books for each University library. The lists of the best books published by the Volkerbund do not meet the needs of German scientific research workers because they are not complete so far as this literature is concerned. The Notgemeinschaft has, therefore, in conjunction with German scientific libraries and a large number of German professors, compiled lists of the most important foreign scientific works and used this as a foundation for supplying University libraries. The appointment of correspondents is now being considered in those countries which are of importance in the world of science who will be able to inform the Notgemeinschaft of important new publications in each country, so that by this means their standard list can be improved.

In connection with the collection of foreign literature the supply of German literature also fell short, for the Notgemeinschaft had, until now, left this to the local authorities. The methods of collecting foreign books by purchase is closely followed by the collection of books by interchange. During last year, as well as the already existing agreement for the exchange of new literature with Russia, a new agreement was made with the Knishnaja Palata and with the "weissrussischen" State library for the interchange of duplicates on a large scale, which has made it possible for us to procure ancient Slavonic literature in a larger quantity than heretofore. The "Interchange Office" of the Library Committee has greatly developed its relations, not only with Russia, but also with all other countries. It was considered specially important to bring German and foreign learned societies into direct touch with each other through the interchange of documents as well as through the Notgemeinschaft. The "State Exchange Office" belonging to the "Reichsministerium" of the Interior, which is under the same directorship as the Library Committee, is also working in the same direction. For example, they have this year established more than 350 permanent agreements for interchange besides the agreements for the interchange of German official printed matter with that of foreign governments.

Much work has also been done by the "Duplicate Department" of the Notgemeinschaft. The combined interchange between University libraries amounted during last year to 30,000 volumes; the

interchange between Government libraries during the last two years being 109,000 volumes.

The newly-established "Suchzettel organisation," which aims at filling the gaps in collections of periodicals, etc., from the duplicates in other libraries also did very good work. It was possible to give information as to the whereabouts of 781 volumes and 2,769 pamphlets. It might be remarked that 239 volumes were complete with the help of the 2,769 pamphlets which had been discovered.

In the coming year the Notgemeinschaft will still continue to devote itself to the furthering of scientific life through making foreign literature available to German research workers and endeavouring to place German publications at the disposal of the research workers of foreign countries.

INDEX.

NOTE.—This is a combined index to the first five Reports of the Association. Against each reference appears the number of the Report (in Roman figures) and the page. It is not a complete subject index to the contents of the papers, but only to the names of speakers and the titles of papers, etc. Copies of the first four Reports can be obtained from the Offices of the Association.

- | | | | |
|---|----------------|--|------------------------|
| Abstracting | II, 75 | Aslin, Miss M. S. | V, 39 |
| Abstracting and Information
Bureaux, International Lan-
guage in relation to | III, 111 | Bacon, H. L. | V, 100 |
| Abstracting for the Scientific
Worker | I, 67 | Baker, Dr. F. A. I, 95, 97; II, 36, 173,
175, 185; III, 90, 93, 97, 109; V, 72 | |
| Abstracting Information, Tech-
nical Press as an Agency for
collecting and | I, 82 | Baker, J. N. L. | V, 52 |
| Abstracting, Scientific | V, 73 | Barbour, W. I, 18, 73; III, 20, 33, 36,
65, 122 | |
| Abstracting Scientific Literature :
possible economies in Printing,
re-printing and | IV, 34 | Barnes, A. R. | III, 97; V, 118 |
| Accident Prevention, Informa-
tion on | V, 101 | Barwick, G. F. | III, 5 |
| Agricultural Research, Certain
aspects of | V, 34 | Baxendale, R. | II, 129, 185 |
| Alexander, Miss | IV, 16 | Bennie, Miss A. L. | I, 50; IV, 77 |
| Allen, Capt. J. S. | V, 97 | Bibliographical Methods, The
Necessity for the Standardisa-
tion of | V, 104 |
| Allen, Miss M. K. E. | III, 64 | Bibliographical Technique for
University Students, Instruc-
tion in | III, 86 |
| America, Special Libraries Asso-
ciation of | II, 54; IV, 67 | Bibliographie, Decimal Classifi-
cation of the Institut Inter-
national de | II, 37 |
| America, Special Library Move-
ment in | II, 50 | Bibliographie, Institut Inter-
national de | II, 25; IV, 56; V, 123 |
| America, North, Special Libraries
Association of | IV, 16 | Bird, L. E. | III, 63 |
| American Library Association III, 5; IV,
67; V, 123 | | Board of Education, Report
of the Public Libraries Com-
mittee of the | IV, 21 |
| Archivist, The Librarian as . . . | V, 53 | Bodleian, Relation of the, to the
Special Libraries | II, 188 |
| ASLIB : | | Bonser, Dr. W. | IV, 44; V, 112 |
| Annual Accounts II, 206; III, 100;
IV, 170; V, 120 | | Book-Review Digest | V, 87 |
| Business Meeting | II, 124 | Book Selection in Science and
Technology, Standards of . . . | IV, 160 |
| Reports on II, 4; III, 5; IV, 17; V, 16 | | Books and Manuscripts, Repro-
duction of | V, 25 |
| Reports of Annual General
Meetings III, 92; IV, 168; V, 118 | | | |
| ASLIB Directory III, 5; IV, 28; V, 114 | | | |

- Books, Arrangement of, in a comprehensive Textile Library IV, 153
- Bradford, Dr. S. C. I, 27; II, 48; IV, 27; V, 104
- British Classification and Indexes, Publication of the . . . IV, 126
- British Patent Office, Statement concerning the . . . IV, 119
- Broadcasting, Effect of, on the Use of Libraries . . . III, 110
- Bromley, H. A. . . . V, 99
- Brown, J. W. H. . . . IV, 40; V, 64
- Bullock, F. . . . III, 90
- Burnham, The Rt. Hon. The Viscount . . . III, 1, 18
- Burton, A. W. . . . III, 63, 84
- Burton, T. F. . . . II, 75, 80, 81
- Business Forecasting . . . IV, 111
- Business Management, Research as an Aid to . . . III, 56
- Business Research and Market Analysis . . . I, 53
- Butler, Sir G. . . . IV, 14, 168
- Butler, M. C. . . . III, 43, 117
- Carnegie United Kingdom Trust IV, 64
- Carnegie United Kingdom Trust, "Outlier" Policy of the . . . III, 7
- Carnegie United Kingdom Trustees, Policy of the, in regard to Special Libraries . . . I, 60
- Cartography and the Research Worker . . . V, 52
- Catalogue, Union, of London Reference Libraries . . . IV, 34
- Cataloguing of Periodicals, Necessity for Uniformity in . . . IV, 44
- Cataloguing Temporary Material II, 90
- Civic and Regional Surveys: their relation to Information Bureaux . . . V, 80
- Clark, Col. W. H. D. . . . V, 22
- Classification and Indexes, Publication of the British . . . IV, 126
- Classification, Decimal, of the Institut International de Bibliographie . . . II, 37
- Classification Decimale, Reports on the Commission Internationale de . . . IV, 60; V, 124
- Classification of a Specialist Library . . . II, 87
- Classification, Systems of, with particular reference to those used in Special Libraries . . . III, 65
- Clearing House for Political Information . . . II, 144
- Clifford, F. W. . . . II, 130
- Cohen, P. II, 139, 154; III, 106, 124; IV, 26, 27, 32, 39, 167
- Cole, P. W. . . . III, 95, 96
- Collecting and Abstracting Information, Technical Press as an Agency for . . . I, 82
- Collection, Classification and Distribution of Records in the work of Information Bureaux and Special Libraries . . . I, 9
- Commission Internationale de la Classification Decimale, Reports on the . . . IV, 60; V, 124
- Conference, Summary of Results I, 99; II, 203
- Cook, Mrs. . . . III, 43
- Cooke, W. A. . . . III, 56, 83
- Co-operation between libraries, government departments, political societies, and other special institutions . . . IV, 30
- Co-operation, Committee on Intellectual . . . II, 18
- Co-operation, International Institute of Intellectual . . . IV, 53
- Co-operation, The League of Nations and the International Institute of Intellectual . . . III, 101
- Co-operative Reference Library, II, 6
- Co-ordination of Medical Information, . . . II, 197
- Co-ordination of Technical Intelligence in Engineering . . . II, 65
- Corse, W. M. . . . I, 32
- Cotton Statistics: their relation to Marketing and Market Estimating . . . IV, 85
- Coulson, Major T. . . . II, 54
- Courtney, Mrs. W. L. . . . II, 58
- Cowley, Dr. A. E. . . . II, 188, 196
- Cox, O. . . . V, 23
- Cunliffe-Lister, Sir P. . . . I, 7
- Data, Transformation of Files of, into an active service . . . III, 70
- Dawson, W. H. . . . I, 30; III, 107
- Decimal Classification of the Institut International de Bibliographie . . . II, 37
- Decimale, Reports on the Commission Internationale de la Classification . . . IV, 60; V, 124
- Denmark, Special Libraries Association of . . . IV, 62
- Directory, The ASLIB III, 5; IV, 28; V, 114
- Dissemination of Information . . . III, 64
- Distribution of Technical Literature . . . III, 49
- Dugdale, Mrs. . . . II, 127, 129, 151
- Duncan, G. S. . . . II, 17, 48, 81
- Dundas, A. J. . . . V, 113
- Durability of Printed Paper and Manuscripts . . . V, 88, 97
- Dutch Patent Office . . . II, 167
- Duyvis, F. Donker II, 71, 167; IV, 59, 60; V, 124

- Earle, F. M. V, 59, 64
 Economic Statistical Bureau in a
 Modern Works Organisation,
 Function of an I, 50
 Education IV, 40
 Efficient Filing II, 96
 Elbourne, E. T. V, 115
 Engineering, Co-ordination of
 Technical Intelligence in . . II, 65
 Engineering Industry, Statistical
 Analyses in the IV, 77
 Engineering Terms, Difficulties
 concerning the Translation of
 highly technical literature, with
 special reference to . . . II, 82
 Engineers, The Institution of
 Mechanical, and its Library . II, 176
 Esdaile, A. V, 65

 Farquharson, A. V, 80
 Farr, H. V, 86
 Faulkner, V. C. I, 92, 94
 Filing and Indexing, The Special
 Library from the administrat-
 ive standpoint, with special
 reference to IV, 146
 Filing, Efficient II, 96
 Finlayson, D. I, 17, 37
 Fletcher, A. V, 14
 Flower, Mrs. L. B. . . . II, 64
 Forecasting, Business . . . IV, 111
 Forecasting, Information Bureaux
 and the Compilation of Data
 for III, 75
 Fraser-Smith, E. W. . . I, 32; IV, 167
 Frind, H. O. IV, 39
 Fuller, E. II, 202

 Garrett, H. V. I, 38, 41
 Gaselee, S. IV, 27
 Gaster, L. I, 94, 95; II, 23, 58, 71, 137
 General Electric Co., Ltd.,
 Information Index and Library
 System of II, 156
 Germany, Patent Classification . IV, 133
 Gilbert, Miss M. V, 87
 Goldsmith, L. D. . . II, 156; III, 19; IV,
 150
 Gomme, A. I, 18, 31; IV, 126
 Gorrie, T. II, 60, 62, 64
 Greenwell, H. III, 19, 54
 Gregory, Sir R. . . . III, 56, 86, 90, 101, 111,
 117, 125; IV, 160, 167
 Griffin, C. R. V, 87

 Halbertsma, Dr. N. A. . . II, 158
 Hall, F. IV, 105
 Hamburgisches Welt-Wirtschafts-
 Archiv V, 121
 Hamer, F. E. II, 132
 Headicar, B. M. . . I, 15, 17, 25, 67; II, 15,
 24, 152, 184; III, 16, 68, 93, 96, 98, 105,
 109, 128; IV, 30, 39; V, 72, 112, 115
 Headlam-Morley, J. W. . . II, 153
 Hecht, C. E. III, 83, 128
 Hetherington, A. L. . . . II, 71
 Hill, W. L. III, 63; IV, 165
 Hoare, F. A. IV, 40; V, 86
 Hodgson, Dr. J. G. V, 38
 Hudson, J. F. III, 49
 Hulme, E. W. . . I, 16, 37, 74; II, 128, 185,
 196; V, 23, 115, 118
 Hutton, Dr. R. S. . . I, 9, 37; II, 4, 18, 63,
 72, 124, 126, 127, 128, 129, 130, 131,
 154, 195, 203, 205; III, 4, 5, 92, 93, 95,
 96, 97, 98, 121, 122, 124, 127, 128;
 IV, 27, 159; V, 16, 39, 78, 115
 Hyslop, A. B. . . . III, 7; IV, 64; V, 114

 Imperial Institute Library, The
 Work of the II, 191
 Index of Technical and Scientific
 Literature, Need for and
 Organisation of an I, 71
 Indexes, Publication of the
 British Classification and . . IV, 126
 Indexes to Technical Periodicals,
 Existing Types of V, 48
 Indexing and Filing, The Special
 Library from the administrat-
 ive standpoint, with special
 reference to IV, 146
 Indexing at the London School
 of Economics, Research Work
 and I, 25
 Indexing, Some new devices in . . III, 45
 Indexing, Systematic III, 20
 Industrial Concern, Library Ser-
 vice of an II, 158
 Information and Statistics, Trade,
 in Great Britain as compared
 with other countries . . . IV, 90
 Information Bureau in relation to
 the Consultant, IV, 152
 Information Bureaux and the
 Compilation of Data for Fore-
 casting III, 75
 Information Bureaux and liaison
 with national and local libraries . IV, 140
 Information Bureaux and Special
 Libraries, The Collection,
 Classification, and Distribu-
 tion of Records in the work of
 Information Bureaux and Special
 Libraries, The Press in relation
 to II, 132
 Information Bureaux, Inter-
 national Language in relation
 to Abstracting and III, 111
 Information Bureaux, Surveys
 Civic and Regional, their rela-
 tion to V, 80
 Information, Clearing House for
 Political II, 144

Information, Co-ordination of Medical	II, 197	Jeffrey, H. J.	II, 191
Information, Dissemination of	III, 64	Jenkinson, H.	V, 53
Information Index and Library System of the Research Laboratories of the General Electric Co., Ltd.	II, 156	Johnson, Col. E. L. I, 37, 64, 73; V, 78, 118	
Information on Accident Prevention	V, 101	Johnson, H. H.	V, 48
Information on the Work and Aims of the Library Co-operation Committee and its Enquiry Office	II, 186	Jones, S. K.	V, 115
Information Service, Report of the Public Libraries Committee of the Board of Education, with particular reference to the place of the Special Library in a national	IV, 21	Jürgens, Dr. A.	IV, 65; V, 126
Information, Training of Men and Women for work in Bureaux of	I, 95	Kaiser, J.	III, 20, 44
Informational Needs in Science and Technology	I, 32	Keeling, G. W.	V, 115
Ingall, C. G.	V, 172	Klingender, F. D.	V, 115
Institut International de Bibliographie	II, 25; IV, 56; V, 123	Kögel, Prof. G.	IV, 159
Institut International de Bibliographie, The Decimal Classification of the	II, 37	Langdon Davies, B. N.	II, 172; V, 31
Institution of Mechanical Engineers and its Library	II, 176	Lawley, F. B.	II, 15, 130, 154
Institut, Nederlandsch, voor Documentatie en Registratuur	IV, 59	Lawrence, Miss A. L.	II, 197, 202; III, 92; IV, 39; V, 63, 119
Instruction in Bibliographical Technique for University Students	III, 86	Leach, T. A.	V, 64
Instruction in Scientific and Industrial Advancement, Place of Technical	I, 64	League of Nations, The Work of the Committee on Intellectual Co-operation of the	II, 18
Intelligence and Publicity, Transport	II, 181	League of Nations and the Work of the International Institute of Intellectual Co-operation	III, 101
Intelligence Service, A National	III, 118	Lewenz, H. I.	II, 82, 86, 127, 131
Intelligence Service, Present Position and Future Development of the	I, 12	Librarian as Archivist	V, 53
Intelligence Service, A University Research	III, 107	Librarianship, School of	II, 175
Intercommunication between Special Libraries	III, 11	Libraries and the Teaching Service	IV, 40
International Institute of Intellectual Co-operation, The League of Nations and the work of the	III, 101	Libraries, Effect of Broadcasting on the use of	III, 110
International Institute of Intellectual Co-operation, Notes on the work of the	IV, 53	Library Co-operation Committee and its Enquiry Office, Information on the work and aims of the	II, 186
International Language in relation to Abstracting and Information Bureaux	III, 111	Library Liaison within the Empire	IV, 39
Jast, L. S. I, 16, 30, 62; II, 15, 16, 23, 63, 90, 95, 129, 139, 185; III, 17, 95, 96, 97, 98, 124		Library of a Daily Newspaper	II, 136
		Library of H.M. Patent Office	I, 18
		Library Resources of London, Unification of the	V, 65
		Library, Scope of a Political	II, 139
		Library, Scope of a Trades Union and Labour	II, 148
		Library Service of a large Industrial Concern	II, 158
		Library System of the Research Laboratories of the General Electric Co., Ltd.	II, 156
		Library, Textile, Arrangement of books in a	IV, 153
		Library, Work of the Imperial Institute	II, 191
		Lindsay, A. D.	III, 1, 4
		Literature of Scientific Management	V, 40
		London School of Economics, Research Work and Indexing at	I, 25
		London, Unification of the Library Resources of	V, 65
		Low, D. H.	III, 90

- Lowe, Dr. E. E. II, 63; III, 17, 44; IV, 168; V, 118
 Lyall, H. G. I, 53
 Lyons, Col. Sir H. IV, 49; V, 111
- McAdam, J. IV, 166; V, 100
 McIlveen, J. A. III, 83
 Management, Scientific, The Literature of V, 40
 Manuscripts, Durability of Printed Paper and V, 88
 Manuscripts, Reproduction of Books and V, 25
 Market Analysis, Business Research and I, 53
 Marketing and Market Estimating, Cotton Statistics: their relation to IV, 85
 Markham, A. V, 118, 119
 Marks, Miss F. III, 97
 Marsden, J. F. V, 40
 Martin, E. A. III, 18, 69; IV, 33; V, 86
 Masters, F. H. I, 82
 Matthews, R. B. I, 82; II, 35, 63, 96, 128; III, 35, 47, 75, 84
 Medical Information, The Co-ordination of II, 197
 Meeting, ASLIB Business II, 124
 Meetings, ASLIB Annual General III, 92; IV, 168; V, 118
 Menken, J. II, 16, 128, 195
 Meulen, Dr. J. ter V, 15
 Meyer, Dr. H. H. B. IV, 27, 40, 67
 Mitchell, Miss C. II, 148
 Mitchell, Lt.-Col. J. M. I, 60
 Mitchell, P. C. II, 11, 15, 16, 17; IV, 64
 Moulton, Major the Hon. H. F. V, 22
 Mowat, Brig.-Gen. M. II, 65, 70, 128, 176; III, 4, 5, 93; IV, 160, 168; V, 116, 117
 Murray, Prof. G. II, 18, 23, 24, 131
- Nathan, Sir F. III, 42
 National Intelligence Service III, 118
 Neath, F. K. I, 65; II, 73; III, 55, 83
 Nederlandsch Instituut voor Documentatie en Registratuur IV, 59
 Newbould, J. T. W. II, 128, 151
 Newcombe, Lt.-Col. L. III, 11, 53; IV, 23; V, 71
 Newspaper, The Library of a Daily II, 136
 Nightingale, S. J. III, 83; IV, 77
 Notgemeinschaft der Deutschen Wissenschaft IV, 65; V, 126
- Orwin, C. S. II, 10
 Otlet, P. II, 25, 35, 63, 81, 153, 205; IV, 56; V, 123
 "Outlier" Policy of the Carnegie United Kingdom Trust III, 7
 Overton, A. E. IV, 90
- Pacy, F. II, 152
 Palmer, E. C. II, 136
 Panel of Expert Translators IV, 159
 Paper and Manuscripts, Durability of Printed V, 88, 97
 Parkinson, H. IV, 33, 110
 Parley, N. IV, 159; V, 25, 88, 100, 115
 Patent Classification: Statement concerning the British Patent Office IV, 119
 Patent Classification: Statement by Reichspatentamt, Germany IV, 133
 Patent Classification: Statement from the United States Patent Office IV, 137
 Patent Law Reform, with special reference to the search for Novelty V, 18
 Patent Office, The Dutch II, 167
 Patent Office, The Library of H.M. I, 18
 Patents and Special Libraries II, 161
 Pearce, J. G. I, 12, 31, 60, 66, 80, 94, 99; III, 118; IV, 17, 166; V, 78, 116, 118
 Periodicals, Existing Types of Indexes to Technical V, 48
 Periodicals, The necessity for Uniformity in the Cataloguing of IV, 44
 Periodicals, The Subject Index to I, 74
 Periodicals, The World List of Scientific I, 78; II, 11; IV, 64
 Photographic Reproduction as applied to printed and MS. material, New methods of IV, 159
 Pickard, Lt.-Col. J. A. A. V, 101
 Pickles, Dr. S. S. III, 70
 Place of the Special Library in Present-day Industrial Practice I, 42
 Place of Technical Instruction in Scientific and Industrial Advancement I, 64
 Plunkett, Rt. Hon. Sir H. II, 6, 10, 58; IV, 33
 Political Information, A Clearing house for II, 144
 Political Library, The Scope of a II, 139
 Pollard, A. F. C. II, 37, 64
 Pollard, Prof. A. W. I, 78; II, 14
 Potts, H. E. II, 80, 126, 161; III, 86, 91; IV, 166; V, 22, 63
 Press in relation to Information Bureaux and Special Libraries, II, 132
 Printing, reprinting and abstracting scientific literature: possible economies IV, 34
 Public Libraries Committee of the Board of Education, Report of the IV, 21

- Public Libraries, The service of, in the Special Libraries Field . I, 62
- Publisher and Research Libraries II, 172
- Rankin, Miss R. B. . . . II, 50
- Rationalisation in Industry . IV, 68
- Records, The Collection, Classification and Distribution of, in the work of Information Bureaux and Special Libraries I, 9
- Reese, Dr. C. L. . . . I, 32
- Reference Libraries of London : is a Union Catalogue a practicable proposition ? IV, 34
- Regional and Civic Surveys ; their Relation to Information Bureaux V, 80
- Reproduction, New methods of photographic, as applied to printed and MS. material IV, 159
- Reproduction of Books and Manuscripts V, 25
- Research as an aid to Business Management III, 56
- Research, Certain aspects of Agricultural V, 34
- Research Intelligence Service, A University III, 107
- Research Libraries, The Publisher and II, 172
- Research Work and Indexing at the London School of Economics I, 25
- Research Worker, Cartography and the V, 52
- Resolutions, ASLIB Conference I, 102 ; II, 203 ; III, 127 ; IV, 166 ; V, 116
- Ridley, A. F. . . . II, 127 ; IV, 140
- Robinson, H. L. . . . IV, 34, 153
- Robson, E. I. II, 85 ; III, 17, 95, 98, 106 ; V, 39
- Rosenbain, Dr. W. V, 14, 64, 73, 79
- Rottenburg, H. I, 71 ; II, 15, 23, 72, 80, 127, 131, 153, 195 ; III, 45, 90, 95, 97, 98, 117 ; IV, 166 ; V, 23, 79, 118
- Rowntree and Company's Cocoa Works, The Technical Library at I, 38
- Sales Policy, Statistical Analyses in the Engineering Industry for use in the formation of a . IV, 77
- Sandbach, Prof. F. E. II, 24, 186, 187, 195 ; III, 18, 53, 128
- Sanderson, C. R. II, 18, 144, 154 ; III, 18, 49, 70, 96, 124 ; V, 111
- Sandry, F. E. . . . V, 87, 115
- Sayers, W. C. B. III, 17, 54, 65 ; V, 72, 86
- School of Librarianship . . . II, 175
- Science and Technology, Informational Needs in . . . I, 32
- Science and Technology, Standards of Book Selection in . IV, 160
- Science Library, Recent Developments in connection with the IV, 49
- Science Library, South Kensington, A short account of the . I, 27
- Scientific Abstracts . . . V, 73
- Scientific Literature, Need for and Organisation of an Index of Technical and . . . I, 71
- Scientific Literature : possible economies in printing, reprinting and abstracting . . . IV, 34
- Scientific Management, The Literature of V, 40
- Scientific Periodicals, The World List of . . . I, 78 ; II, 11 ; IV, 64
- Scott, G. S. IV, 166, 167 ; V, 78, 118
- Searight, Miss G. . . . II, 62 ; III, 17
- Secker, Miss K. . . . II, 195
- Sellars, Major E. L. . . . III, 41, 84
- Sharp, H. A. . . . IV, 39
- Sheppard, R. L. . . . III, 91 ; V, 51
- Simnett, Major W. E. II, 10, 15, 62, 63, 65, 72, 73, 74, 80, 85, 138, 151, 174, 181, 184
- Smith, F. S. . . . IV, 33, 34
- Special Libraries and the Technical Press, A Note on the relationship between . I, 92
- Special Libraries Association of America . II, 54 ; IV, 67 ; V, 123
- Special Libraries Association of Denmark . . . IV, 62
- Special Libraries Association of North America . . . IV, 16
- Special Libraries, The collection, classification and Distribution of Records in the work of Information Bureaux and . I, 9
- Special Libraries Field, The service of Public Libraries in the . . . I, 62
- Special Libraries, Inter-communication between . . . III, 11
- Special Libraries, Patents and . . . II, 161
- Special Libraries, The Policy of the Carnegie United Kingdom Trustees in regard to . . . I, 60
- Special Libraries, The Press in relation to Information Bureaux and . . . II, 132
- Special Libraries—The Problem of Co-operation with the Public Service . . . II, 60
- Special Libraries, The Relation of the Bodleian to the . . . II, 188
- Special Libraries, Systems of Classification . . . III, 65
- Special Library from the administrative standpoint, with special reference to methods of indexing and filing . . . IV, 146
- Special Library Methods . . . I, 80

- Special Library Movement in America II, 50
- Special Library in a National Information Service, The Report of the Public Libraries Committee of the Board of Education, with reference to the place of the IV, 21
- Special Library, The Place of the, in Present-day Industrial Practice I, 42
- Specialist Library, The Classification of a II, 87
- Spencer, C. A. III, 97
- Sproston, F. II, 17, 130; III, 19, 43, 97; IV, 150
- Standardisation of Bibliographical Methods, The Necessity for the V, 104
- Statistical Analyses in the Engineering Industry for use in the formation of a Sales Policy IV, 77
- Statistical Bureau in a Modern Works Organisation, Function of an Economic I, 50
- Statistics and Information, Trade, in Great Britain as compared with other countries IV, 90
- Steel-Maitland, Rt. Hon. Sir A. II, 1
- Steenwijk, Dr. J. E. de Vos Van III, 101, 106, 122; IV, 53, 165
- Stobart, J. C. III, 110
- Strachey, Miss P. II, 154
- Stubbs, Miss L. I, 42, 49, 80
- Subject Index to Periodicals, The Surveys, Civic and Regional: their Relation to Information Bureaux V, 80
- Systematic Indexing III, 20
- Tattersall, F. W. IV, 85
- Teaching Service, Libraries and the IV, 40
- Technical Instruction, Place of, in Scientific and Industrial Advancement I, 64
- Technical Intelligence in Engineering, Co-ordination of II, 65
- Technical Library at Rowntree and Company's Cocoa Works, York I, 38
- Technical Literature, Difficulties concerning the translation of II, 82
- Technical Literature, The Distribution of III, 49
- Technical Literature, Need for and Organisation of an Index of Scientific and I, 71
- Technical Periodicals, Existing Types of Indexes to V, 48
- Technical Press as an Agency for collecting and abstracting information I, 82
- Technical Press, A note on the relationship between Special Libraries and the I, 92
- Technology and Science, Standards of Book Selection in IV, 160
- Textile Library, Arrangement of books in a comprehensive IV, 153
- Thompson, Dr. J. D. II, 57, 59
- Thomson, Sir J. J. IV, 14
- Thorne, Dr. L. T. V, 39, 79, 113
- Thorne, W. B. III, 55; V, 86
- Thurston, Dr. A. P. IV, 168; V, 18, 22, 24
- Thyregod, O. IV, 62
- Tingley, T. J. V, 119
- Trade Information and Statistics in Great Britain as compared with other countries IV, 90
- Trade Survey, The IV, 105
- Trades Union and Labour Library, The Scope of a II, 148
- Training of Men and Women for Work in Bureaux of Information I, 95
- Translation of highly Technical Literature, Difficulties concerning the, with special reference to Engineering Terms II, 82
- Translators, A Panel of Expert IV, 159
- Transport Intelligence and Publicity II, 181
- Tripp, Dr. E. H. V, 34, 51, 78
- Tritton, F. J. V, 79
- Tritton, Mrs. S. M. V, 112
- Turner, P. K. I, 17, 37, 73; II, 16, 24, 80; III, 33, 44, 69, 97, 98, 111; IV, 28, 146, 150, 152; V, 23, 24, 63, 79, 112, 115
- Twentyman, A. E. II, 87, 176, 203, 204; IV, 21
- Unification of the Library Resources of London V, 65
- Uniformity in Cataloguing of Periodicals, The Necessity for IV, 44
- Union Catalogue of London Reference Libraries IV, 34
- United States Patent Office, Statement on Patent Classification IV, 137
- Universities Bureau of the British Empire I, 30
- University Research Intelligence Service III, 107
- Unwin, S. II, 173
- Urwick, Major L. III, 19, 62; IV, 68, 118; V, 44
- Vocational Guidance and Selection V, 59
- Wallace, W. IV, 111

Walter, K.	II, 24	Works Organisation, Function of an Economic Statistical Bureau in a modern	I, 50
Warner, J.	V, 86, 118	World List of Scientific Periodi- cals, The	I, 78 ; II, 11 ; IV, 64
West, R. F.	V, 63	Wright, A. R.	IV, 119, 124
Wharton, L. C.	III, 44, 91, 106, 117	Wright, Dr. O. K.	II, 59, 85, 201
Wilks, J.	III, 53		
Willey, G. B.	II, 73		
Withers, Dr. J. C.	I, 17, 37, 67 ; II, 62 ; III, 43 ; IV, 34, 152, 165	Young, Dr. C. R.	IV, 34